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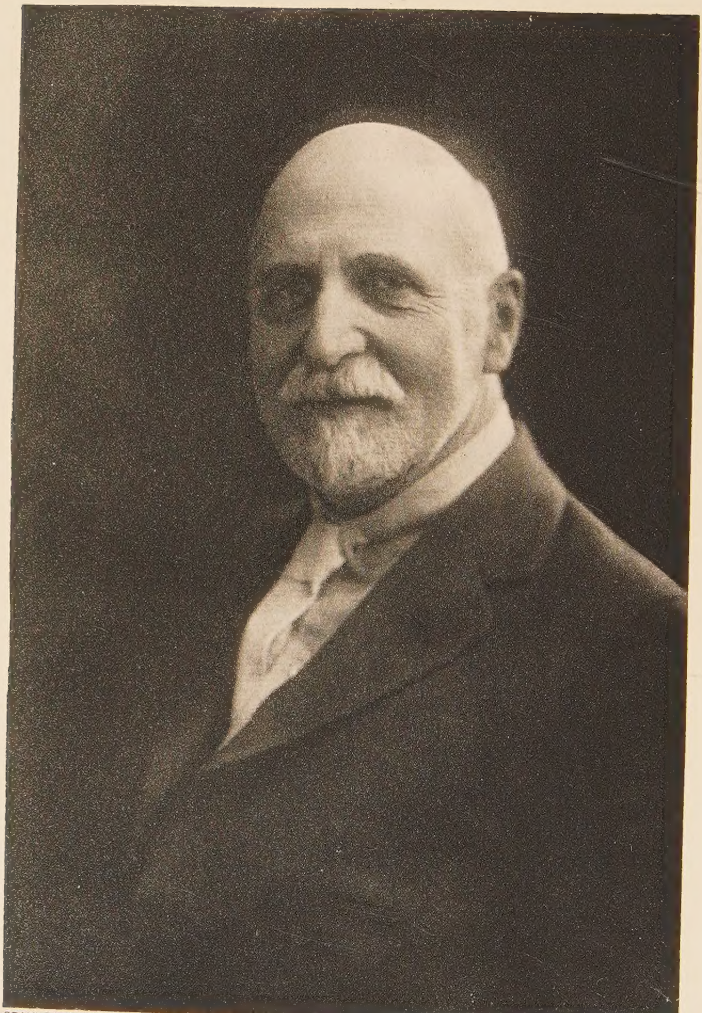

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Alex Dow

PRESIDENT 1928
OF
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Record and Index

Volume 2—1928

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FOREWORD

THE YEARLY RECORD of Society affairs and index to its publications is becoming a source book of increasing value. As a historical record of the activities of the Society during the year 1928 it combines all of the reference material likely to be of permanent worth to future searchers and as an index it is a means of locating the technical information contained in all of the Society's publications. The index combines in a more complete form than heretofore attempted the separate indexes of the Transactions and *Mechanical Engineering,* as well as references to the reports and other technical publications of the Society which have appeared during the year. The scope of the Transactions index has been greatly broadened with the intention of making available material which is frequently a part of papers or discussions but not so closely related to the subject of the paper indexed as to be located by the usual references to that paper. This feature has become necessary because under the new publication policy a member does not receive the complete Transactions, and therefore must rely upon a thorough index rather than a careful scrutiny of the volume itself. The combined index provides a single source of reference to the technical literature of the Society for 1928.

While this volume contains much information about the organization and operation of the Society it must be remembered that it is a historical record and not a year book or hand book. For such current information as the personnel of the Society's committees, officers, representatives, local sections, student branches and the like, the Membership List should be consulted.

Special care has been exercised in the preparation of the memorial notices which comprise the necrology and where the information has been available more complete notices have been prepared than has been customary in the past.

This Record and Index is the second published by the Society. The material it contains is presented differently than it was in the old series of Transactions. It should render a valuable service to the Society.

E. D. Dreyfus, *Chairman,*
W. A. Shoudy, *Vice-Chairman,*
F. V. Larkin,
W. H. Winterrowd,
L. C. Morrow,
Publications Committee.

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ALEX DOW

ALEX DOW, President of The American Society of Mechanical Engineers for the year 1927-1928, was born in Glasgow, Scotland, on April 12, 1862. On his father's side he came of a Highland family in which for many generations the oldest son had been a skilled iron worker. His father, an expert accountant, had served an apprenticeship at the forge. The boy when five years old went to what was the public school of that day and place — the school of a Scots Presbyterian parish. His ambition was to train himself as a marine engineer. Circumstances balked this ambition and he went to work, before his twelfth birthday, as a messenger in a railroad office, and continued in that service six years, as junior clerk and stenographer. Thereafter he found clerical employment with the Cunard Steamship Line in Liverpool and at sea, and he spent his spare time in the engine rooms of the steamships.

In November, 1882, Mr. Dow came to the United States to remain, and was first employed in various departments of the Baltimore and Ohio Railroad. He was transferred later to the Baltimore and Ohio Telegraph Company to take charge of local line and instrument maintenance, with some construction and some experimental work on telephones. In 1888 he found employment with the Brush Electric Company of Cleveland, which was then manufacturing the Brush series arc-light dynamos and other electrical machines invented by Charles Francis Brush. His first assignment was that of installation electrician of the Brush Company's Chicago office. In 1889 he became district engineer at that office.

Mr. Dow removed to Detroit in 1893, to design and build the original public lighting plant owned by the city. In 1896, the plant being in successful operation, he accepted an engagement to manage the Edison Illuminating Company of Detroit, which was the predecessor of the Detroit Edison Company, and has remained with the company, as Vice-President until 1912 and President since then.

Together with the engineers whom he associated with himself as his Detroit Edison staff, particularly James W. Parker and Prof. C. F. Hirshfeld (Members of the A.S.M.E.), Mr. Dow designed and built not only the well-known Conners Creek electric power plant in Detroit, but also the Marysville and Trenton Channel plants.

Although a graduate of no university or technical school, Mr. Dow received the honorary degree of master of engineering from the University of Michigan in 1911, and the honorary degree of doctor of engineering in 1924.

Mr. Dow's membership in the A.S.M.E. dates from 1895, that in the American Society of Civil Engineers from 1906, that in the American Institute of Electrical Engineers from 1893, and that in the Institution of Electrical Engineers, Great Britain, from 1911. He served Detroit as the engineer member of the Board of Water Commissioners from 1916 to 1921; and again from 1925 until the present time. That Board has had in hand for the last four years the duplications of the city's water supply, a work which will require another three years for completion. Mr. Dow is a Charter Member and Past-President of the Detroit Engineering Society.

Presidential Address

CONSISTENCY[1]

By ALEX DOW, Detroit, Mich.

TRADITION and precedent require that I shall make a Presidential Address, wherefore this effort. Tradition and precedent demand that the Presidential Address shall be of the nature of a message to the Membership — a deliverance ex cathedra, wise in content and literary in form. The making of such an address is for me no customary exercise of the wits and the language given me by Providence, or acquired from environment. As a distributed credit or debit between Providence and environment, the responsibility for that equipment of mine is about fifty-fifty. The wits, such as they are, apparently came from Providence by the path of heredity. Environment supplied the language — and left permanent marks upon it.

The peculiar perversity of the present moment is that I have no honest-to-goodness message for you. This semblance of a message should be classified as make-believe. In each make-believe there must needs be a certain grain of reality — otherwise it would entirely lack verisimilitude. From this present make-believe you may therefore cull such particles as seem to be realities, and relegate the remainder to the limbo provided for forgotten fairy tales.

The same remainder, although it is by assumption make-believe, is not of necessity untruthful. It may even be consistent. That word "consistent" has pestered me of late. I have listened to talk of consistent statistics, of consistent policies, of consistent behavior, of consistent merit, until the word begins to rub a sore spot into my hide. Not a big sore spot — just such as one occasionally acquires at an inconvenient locus. My choice of an inconvenient locus is directly under the tip of my right shoulder blade. Yours probably is somewhere else, but as a preferred location of consistent inaccessibility I present to your judgment the tip of the right shoulder blade as meriting the blue ribbon.

This impingement of an overfrequent word upon my mentality is no new experience. Many years ago when welfare (by implication, welfare of employees as a duty of employers) was much talked about,

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[1] Presidential Address at the Annual Meeting, New York, N. Y., December 3 to 7, 1928, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

I developed a cantankerous hostility to the word "welfare." Looking backward from this remote era, I realize that what offended me was but little the overwork of a good word, and was very much indeed the superfluity of talk about good work done. My personal code required me (and still does) when there should be an opportunity to be helpful to a fellow-mortal, to be helpful as and when the circumstances permitted, to thank God for the opportunity, and thereafter to hold my peace. There is less noise nowadays and more welfare.

Another word which irritated the right shoulder blade was "efficiency." There was so much palaver about efficiency as a generality rather than as a local entity clearly definable, that I found myself sympathizing with the railroad-yard roustabout who named his mule "Efficiency," sometimes adding thereto as a momentarily opprobrious epithet the word "Engineer." That mule always did want to do things differently from other mules. The merit of his differentiations was not apparent. In the circumstances of time and place and as a mule he probably earned the title.

Still one other word has recently been ruffling me, which word is "research." It makes no amelioration of my irritation that the word be accented on the first syllable instead of on the second — and if it continues to be an irritant, I think I shall move to substitute some compound phrase such as "technical investigation" for the irritating two syllables. What I shall then call those who are now by title Junior Research Engineers remains to be seen — or heard. It may not be tactful.

The word "consistency" is not yet classified by me as an irritant. I am minded to help save it from misuse — to limit its application to the useful quality which it signifies by dictionary definition. That quality is

> . . . . a state of compatibility and harmony between things that can exist in the same system—or of operations and agencies that are controlled by one aim and therefore do not neutralize one another.

A most meritorious quality forsooth, and two excellent and consistent definitions! Observe that consistency is not a synonym for conformity nor congruity nor changelessness. The vital words in the definition appear to me to be those which recognize the control of purpose *by one aim*. And such seriousness as there is in this talk is directed toward the redemption of a good word from misuse, and to the praise of a truly valuable quality.

I asked one of the most helpful ladies in the world to find for me somewhere in Shakespeare's works the quotation, "Consistency, thou art a jewel," and in due course my friend informed me that Shakespeare did not say so but that some one unknown, in a ballad of a date long after Shakespeare, ended a quatrain with the line "consistencie's a jewell." In my own efforts to authenticate that quotation I fell over the statement by Emerson: "A foolish consistency is the hobgoblin of little minds."

There is no conflict between the two authorities. And by assumption there are no little minds in this audience. Little minds do not wilfully expose themselves to presidential addresses. That act implies fortitude — and optimism.

It appears to me that *unity of aim* is the test of appropriateness of use of the studied word. Further, it is the touchstone for the expressed quality in thought or speech or action. And I have come to understand that most misuses of the word and failures to exhibit the quality have their roots in the lack of a well-defined aim, or in a wavering from that aim.

Consistency: Is It Inborn or Acquired?

Query: Before proceeding further, are we born consistent or is consistency (if we have any) an acquired virtue? The alternative question may be rephrased as: Can consistency be acquired in later life? And I think it can be disposed of by saying that a restricted environment may compel consistency, but that the person who has not had in him from childhood some root of consistency will never be consistently consistent. I may also rephrase the first part of the query by asking: Are children born with the virtue of consistency and do they lose it from lack of encouragement in its exercise? To this query my own answer would be "Yes." Every child is a consistent person. He meets existence as something that may expand around him from its original limitation by his mother's arms to the unlimited bounds of a universe, provided that Professor Einstein has left to us our lack of limits and has not in the interim cribbed, cabined, and confined all space around us grownups. A child accepts this sequence of expansion and demands that each new fact offered to him shall be consistent with each prior fact. Everything that he learns is forthwith correlated and closed up on the knowledge already stored in his mind. This also holds for principles of conduct. It is absolutely fatal to your respect by a child to let him do something today which you are going to forbid tomorrow and to tolerate the day after. He refuses to accept a divergence of aim, and his sense of justice, resenting his being forbidden to do something that was formerly tolerated, or his being required summarily to do something that was previously omitted — his childish sense of justice makes of him a rebel.

As to facts, the little people are born without skill to differentiate between imagination and what we grownups call reality. They apply the philosophy that we do our true living in our own minds and not in an outer world, and it requires painstaking, patient education to bring them safely to the understanding that this world in which they are initiate requires a separation between that which is demonstrable to the senses and that which is imagined.

My own job of education of young people ought to have been finished long ago. The baby of the family is twenty-eight plus. But the turn of the wheel has brought to my home to stay awhile a five-year-old who is just now learning philosophically the differences between fact and fancy. I do not think that it was exactly fair to assign to me a job as instructor. Yet I was successful in establishing with her the stipulation of my own childhood, that when a story began with the prefix " once upon a time " it was a story told merely because it was pleasant to listen to, and not at all as a recital of what grownups would call " observed occurrences." That stipulation made the young lady free of the Just So stories, and of Twilight Land, and Grimm, and the prettier tales of the Arabian Nights. When she thereafter demanded that I discuss fairies and djinns I had to turn my memory back a full sixty years to the days when I myself had a practicable modus vivendi with a certain number of fairies, and a few djinns, and even a casual imp or two, and she and I now share that friendly understanding and are prepared to be properly courteous to visitors of those tribes if and when they shall manifest themselves. That was well done, and I enjoyed the event. But I assumed an attitude of protest when, after certain Sunday School books had introduced her to angels duly depicted with wondrous wings, the young lady insisted that some one inform her *whether* when these angels went to sleep they took off their wings and went to bed or whether they roosted. I do not think I was a proper referee, and indeed I took refuge in the evasion that I did not know. That was a definite disappointment to her, and I explained my lack of knowledge by the statement (which was partially truthful) that the reason I did not know was that when angels undressed they always put me out of the room beforehand. Talk about consistency — should I be expected to make consistent the vision of golden-winged angels with the nocturnal habits of little ladies or of dicky birds? That was no fair question to ask the President of this Society!

How Far Shall Consistency Give Way to Usefulness?

Another query: How far shall consistency give way to usefulness? For illustration let me recall the well-known fact that for many years the Buick motor cars and the Dodge motor cars had a gear shift which was reversed in sequence from the gear shift of all other cars made on this side of the ocean. The gear shift of those two companies was well considered and consistent. It is highly appropriate that the forward motion of the gear shift lever shall coincide with the forward motion of the car. It is an evidence of superhuman intelligence that the running position of the lever shall take it out of the way of the knee of the driver or his passenger. In these respects the gear shift which we now accept as standard was and is lacking in true consistency. If the aim of the builders had been to conform their car to their own ideals we should continue indefinitely to be under the necessity of remembering which particular trick we are driving, for it is most awkward, when you want to make a quick start from the line on the change of the signal, to back up and bump the man behind you. But if the true aim were to build an acceptable car for the American public, consistency required the setting aside of the minority fashion, and the change was well made.

And here is a collateral query. Supposing that the Buick and Dodge companies had felt called upon to deny the rightness, the truthfulness, the heaven-born equity of any other arrangement of gating. Supposing that they had announced there would be no departure from conscience; would they have found support? I know that such a thing is a tax upon supposition, but you can try to imagine it. Suppose it had been insisted that there could only be one truly righteous way of gating a gear shift, and that all others were contrary to revelation and the evident intent of Providence that forward motion should coincide with forward motion. Supposing that they had appealed to state legislation to prohibit the teaching of any way of shifting gears excepting that which required this coincidence. Suppose — Oh! let us quit supposing! The motor industry has been for many years one of the wisest in its acceptance among competitors of those practices which the public found good, and its collective wisdom has made such acceptance a simple and commercially profitable matter. Nevertheless that whimsy of a fundamentalist General Motors Corporation does tickle me.

Query, one time more: How far may a Society like our own expand its assistance to meritorious projects? Our aims are set forth with reasonable conciseness in our Constitution and By-Laws, and these aims are not divergent nor inconsistent. But there is a constant call upon us as a Society to scatter our efforts, to turn our organization to other aims and objects than those on which we are united by definition. Such objects may be praiseworthy. They may tend to save souls, which is ideal; or they may tend to fill hungry mouths on earth, which is practical and much more important. That you may understand how much of a heretic I am, let me declare my fellowship with those mortals who try to do what they can for the world in which we live and move and have our being; and my total lack of sympathy with those others who are concerned about the ordering and magnitude of our mansions in the skies. Let the gods see to the latter! But in the name of consistency, let us say that the unity of aim of this Society is set forth in its Constitution and that concentration therein is the bond that holds us together! If we are going to take up the work of the church, of the state, or of the municipality, or any part thereof, we shall have to expand our statement of aims and our qualifications for membership until we receive into our Society all men of good intent, and are prepared to act upon any proposal whatever which tends to the betterment of society — and that road leads to disunity and disaster.

Are Our Methods of Educating Engineers Consistent?

Query: Are our methods of educating engineers consistent? If required to define our aim we discover that our target is not a unity but a diversity. Be it noted that the pupils under education are free agents and that each of them has his own aim and purpose. Possibly this complimentary assumption is not justifiable. I have met engineering pupils who were so obviously without purpose or sign of ultimate utility that I have despaired of their ever being anything more than " chinking." That word has its root in the old-time building of the log cabin when the interstices between logs were stuffed with chips and wet clay, which material was chinking. It was good for nothing else.

Now, you will find in any engineering college two groups who are receiving (Query: are exposed to?) a standard prescription of schooling notwithstanding divergent group purposes. One group, who individually have my hearty sympathy, are young men having a bent for engineering and who must needs educate themselves as quickly as possible to the point where their selected profession may begin to make them a living. The other group are under no such stress. It contains the men who are seeking knowledge for the love of knowledge — the natural investigators of physical phenomena. Likewise it contains the young men whose family or business prospects are of such a nature that an engineering education will be helpful in the furtherment of those prospects. Finally this group contains the few who intentionally seek engineering training as part of a liberal education.

Even if there be no other divergencies of aim, the adoption by most of our schools of a compromise formula for engineering education is inconsistent with the divergent aims of the students, who are there by their own volition and without whom there would be no school. One group requires training toward immediate and profitable usefulness in this rough-and-tumble world which in the main selects its servants by the " hire-and-fire " system. The last year of training of these boys should be as specialized as the training of a polo pony or a steeple chaser or a lady's hack. Some schools provide just that sort of training. The other group of students should have more science and less shop and drafting-room training — more Taussig and less Taylor — and there are schools which fit their needs. Most schools compromise their curricula into consistency in the attempt to serve both groups.

To my mind the answer is — separate schools. Let the youngster who must become a useful and productive junior member of the profession at the earliest possible moment — let him choose the school that will turn him out trained to the minute for an awaiting job. Let the other students go to a university where the broad principles of engineering are taught as an incident of a broader teaching of physics — or of natural philosophy, as we used to call it years ago. Thus only may each curriculum have the unity of aim which will make it consistent.

Wherein Lies Our Human Need of Consistency?

Wherein lies our human need of consistency? Is it an evidence of superiority of mankind above the other diversified creatures of God? I think so. If we are to be controlled by intellect, choosing and planning our ways in life, we must insist that each thing decided in our individual lives shall remain decided and not be open to perpetual discussion. Our seeking must be for accomplishment and not for chatter about possible or past accomplishment. Our need is that it shall be so — that having done one thing we shall go on in peace to the doing of the next. We do not desire repetition — far from us be such monotony! But we insist that there shall be continuity by consistency in the rule of life. And we have set up for our chosen worship a divinity "in whom there is no variableness, neither shadow of turning." Amen!

Now to close this talk in a lighter mood; it is not laid upon us that we shall be consistent to the verge of absurdity. That is what Emerson intended when he called consistency the hobgoblin of little minds. The absolutely consistent person can be as much of an impediment or a nuisance as the man with an ingrowing conscience. It is well that this lesson should be learned early in life — it usually is. Once upon a time — please notice the formula — there was a little lad about twice the age of the young lady who recently stumped me with the question as to angelic methods. He had a shock of dark hair on his head — hair too fine to wear well — and he was quick of thought and speech. As is the fashion of eleven-year-olds, ofttimes his speech outran his thought. He was consistent, very much so indeed. Probably he inherited that quality from his grandchildren. I *chose* that word "grandchildren." It was not a slip of the tongue. I ask you why should not a man inherit his qualities from his descendants? I know the descendants have just those qualities, and if time is no more, or if it is looped upon itself like the serpent symbol of eternity, holding its tail in its mouth, why should the qualities of the father be visited upon his children and not vice versa? If it is not so then Einstein is wrong, and I claim thanks. I don't desire to think of space as corded up in a spherical bundle, nor of time as a form of thought.

To go on with the story: This interesting young person was one of a group which in the long winter evenings of the far north must needs amuse themselves indoors, and did so by playing many forgotten games. Of one of these the name was "Forfeits," and in the playing of it one-half of the party was sent out of the room, to be called in again singly and by name and required to execute any one of a hundred traditional tasks for the amusement of the group which was having its innings. On the evening of my story, the party was large and divided fairly between boys and girls, and the girls had sent the boys out of the room, and my young friend when called in was informed that because of his manifold transgressions the penalty was laid upon him to "Take good regard of this assembly of wit and beauty and forthwith bow to the wittiest, kneel to the prettiest, and kiss the one you love best." I have said that the lad had inherited consistency. To him the game was the game and the order was the order. He regarded his laughing judges, and after a minute bowed to the undisputed wittiest of the girls. Her wit had a well-known touch of acid, and the choice brought a ripple of laughter. To select the prettiest required the exercise of judgment, and consistency misled him into kneeling to a certain golden-haired beauty. To this day he still insists that she was the prettiest then and there in the room. The third requirement was simple — he knew the one he loved best, and he turned happily to that one. Did he kiss her? He did not. Instead of the expected upturned cheek he received on his own two cheeks a right-handed and a left-handed buffet from a pair of wicked little hands, and the defiant challenge — "If you think Helen is prettier than I, you can just go and kiss *her*."

Of course there was much laughter and a sadly puzzled boy. Later he told his sorrows to a wise and lovely friend of twice his age, who counseled him, "Laddie, never hint that any one is prettier than your own sweetheart. In sweethearting, flattery goes further than consistency."

The moral must be obvious. Each of you have known eleven-year-old love, and to the gentle memory of that love I now leave you.

General Information

GENERAL INFORMATION

AS ITS interests broaden and its activities increase, the presentation of information concerning the Society through every available source becomes increasingly important. Each unit of the organization feels this responsibility and endeavors to discharge it not only through the channels of the *A.S.M.E. News* but also by issuing such pamphlets as those on "A.S.M.E. Technical Committees," "Research Activities," and "Student Branches." Copies of these pamphlets are freely distributed and may always be obtained from the headquarters of the Society upon request.

For those who prefer one source for complete information the following pages have been prepared. Part 1 renders in non-legal language the import of the Constitution, By-Laws, and Rules of the Society, for easy reference use in matters pertaining to the organization of the Society and its activities. It also contains certain information of historical nature, such as the lists of recipients of awards and portions of the matter concerning research, standardization, etc. Part 2, beginning on page 57, presents the personnel of the Council and standing and special committees, and A.S.M.E. representatives on joint activities for 1928; lists of Professional Divisions, Local Sections, and Student Branches, with names of chairmen; lists of professional (technical) committees; a summary of membership; and lists of honorary members and past officers of the Society.

PART 1

THE ORGANIZATION OF THE SOCIETY

The American Society of Mechanical Engineers was founded in 1880 and chartered under the laws of the State of New York in 1881. Its headquarters are located in the Engineering Societies Building at 29 West 39th Street, New York, N. Y.

OBJECTS

The objects of this Society are to promote the art and science of mechanical engineering and the allied arts and sciences; to encourage original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and severally and in cooperation with other engineering and technical societies to broaden the usefulness of the engineering profession.

Constitution, By-Laws, and Rules

A new Constitution was adopted in 1922, and amended in 1924 and 1926. The By-Laws and Rules have been correspondingly revised. The complete Constitution, By-Laws, and Rules appear elsewhere in this volume.

Administration

DIRECTORS (COUNCIL) AND OFFICERS, AND THEIR ELECTION

The Society is governed by a board of directors styled "The Council," subject to the limitations of the Constitution. The Council consists of twenty-two members elected by letter-ballot of the membership of the Society, from nominees selected by the Regular Nominating Committee. The membership of the Council for 1928 is given on pages 57-58.

The officers of the Society consist of the President, the Vice-Presidents, and the Treasurer. The Treasurer, and also the Secretary, are appointed by the Council. The 1928 personnel will be found on page 57.

The *Regular Nominating Committee* is selected annually by delegates of the Local Sections to the Annual Meeting, and is confirmed by the Society in open session at this meeting. The Nominating Committee solicits suggestions from the membership for nominees for the Council and makes its selection after conferences and open sessions at the Semi-Annual Meeting. A special Nominating Committee having the same powers may be organized by any group of one per cent of the membership of the Society as provided in the By-Laws.

The Regular Nominating Committee for 1928, together with the grouping of the Local Sections through whose delegates it was selected, is given on page 61.

COMMITTEES

The Council is assisted by sixteen administrative and professional (technical) standing committees, represented without vote on the Council by their chairmen. Other Special Committees are appointed from time to time on the recommendation of a Meeting of the Society or of a Standing Committee of the Council, or by the Council itself.

The *Committee on Constitution and By-Laws,* under direction of the Council, has supervision of matters affecting the Constitution, By-Laws, and Rules, and reports on all matters in this connection referred to it by the Council. It does not institute policies. The personnel of this committee for 1928 will be found on page 59.

The *Finance Committee,* the personnel of which for 1928 is given on page 58, has supervision of the financial affairs of the Society. These cover the receipt and disbursement of funds, including moneys received from the membership, income secured from the sale of publications, contributions for special purposes, such as research and standardization, and special trust funds.

Subsequent pages present information concerning the work and personnel of other committees.

MEMBERSHIP

All matters of admission of new members, of transfer of members from one grade to another, and of terminations of membership are in charge of the Membership Committee under the direction of the Council. The personnel of the committee for 1928 is given on page 58. A summary of membership, corrected to January 2, 1929, will be found on pages 81-82.

The constitutional requirements for admission to the Society are included in Article C4, Sections 3 to 6, of the Constitution.

Application for Admission

Application for admission must be made upon a form which may be obtained from the Secretary or from officers of Local Sections. This form provides for a statement of the education and professional experience of the applicant and references from members of the Society who have personal knowledge of engineering experience of the applicant; the number of references depending upon the grade of membership desired. Local Sections officers will cooperate with members desiring to assist engineers making application for membership in the Society.

Procedure for Election

Upon receipt of an application by the Secretary, the name and occupation of the applicant is posted in the *A.S.M.E. News* and members of the Society are given a twenty-day period within which information regarding him may be forwarded to the Membership Committee. During this period statements are secured from those members named by the candidate for references, and the Executive Committee of the Local Section to which he would logically be assigned may also be consulted concerning his qualifications.

The Membership Committee then considers all information received, and if the applicant is found eligible for membership, his name is presented to the Council by letter-ballot, with the recommendation of the Committee specifying the grade of membership for which he is qualified. The Council votes on the application within thirty days after the letter-ballot is sent, and candidates receiving the approval of the Council are notified of their election.

An initiation fee and dues for the remaining portion of the Society's fiscal year, which begins on October first, are payable upon notice of election; thereafter dues are payable annually in advance on the first of October. Upon acceptance of election by payment of the initiation fee and dues, a new member is assigned to the Local Section nearest him.

Membership Privileges

The benefits of membership depend in a large measure on the amount of personal interest taken by the individual. The dues in themselves entitle the member to the following publications: The sections of Transactions for those Professional Divisions in which he is registered; the monthly journal of the Society, *Mechanical Engineering;* the semi-monthly *A.S.M.E. News;* and the annual Record and Index, Membership List, and Condensed Catalogues; the right to wear the official badge of the Society, which may be purchased from the Secretary; and the privilege of using with his name the approved abbreviations denoting his connection with the Society, as follows:

Honorary Member	Hon. Mem. A.S.M.E.
Member	Mem. A.S.M.E.
Associate	Assoc. A.S.M.E.
Associate-Member	Assoc-Mem. A.S.M.E.
Junior	Jun. A.S.M.E.

A member who puts *himself* into the Society by attending meetings, serving on committees, both national and local, presenting papers or taking part in discussions, etc., receives a return on his investment, which, in the opinion of some of the older members, is of inestimable value.

INSIGNIA

The design of the seal of the Society is based on the saying which is attributed to Archimedes δὸς ποῦ στῶ καὶ τὸν κόσμον κινήσω (Give me where to stand and I will move the earth).

At its meeting on May 14, 1928, the Council voted that the seal of the Society or any representation of it should be used only on official publications of the Society, which are issued by definite or inferred authorization. Such publications include the regular publications, such as *Mechanical Engineering,* Membership List, Transactions reprints, *A.S.M.E. News,* Record and Index, Engineering Index Annual, Boiler Code, Power Test Codes and the other approved standards, and programs of Annual, Semi-Annual, and other general meetings of the Society.

The official badge of the Society is a four-leaf clover design bearing the Society's initials. The badge for Honorary Members, Members, Associate-Members, and Associates is in dark blue enamel, with letters in bright gold. The Junior badge is in crimson enamel. Student Associates may wear a student pin, which combines the Society's official badge and the colors and initials of his college.

The badge is supplied in two sizes, the small one being the size here shown, and the large about twice this size. Forms of the large size are catch-pin back for wearing on coat lapel or vest and double-faced charm for watch fob or chain. Forms of the small size are catch-pin back and screw back. Prices of the official badge may be obtained from the Secretary.

MEETINGS

Through its meetings the Society offers opportunities for members to gather and discuss the latest developments and newest thought in mechanical engineering and to gain the stimulus of contact, the excitation of one's mental processes, that come from personal participation in the activities of his professional group. Not the least of the advantages which attendance at a meeting gives is the excellent opportunity for making friendships and developing professional fellowship.

The Committee on Meetings and Program, which is listed on page 58, has supervision of the Annual, Semi-Annual (Spring) and other general meetings of the Society, and cooperates with the Professional Divisions and the Committee on Local Sections in regard to the National Meetings of the Divisions. The meetings held during 1928 are reported elsewhere in this volume.

Scope

The broadening scope and activity of the Society is reflected in the programs for Society meetings which include not only technical sessions, entertainment and excursion events, but many committee meetings, public hearings, and gatherings of allied bodies. The meetings are the great clearing houses of experience and knowledge in the mechanical-engineering field, and every member is sure to find much of interest and inspiration in the programs.

There are several classes of Society Meetings, each designed to satisfy a particular need.

Annual and Semi-Annual Meetings

The Annual and Semi-Annual Meetings still carry out their original purpose of bringing together all phases of mechanical engineering in a program which will give a free interchange of information between the specialists and will provide an opportunity for emphasizing the unity of the mechanical engineering profession and for developing a progressive program for the entire group.

The Annual Meeting, as specified in the Constitution, must begin in New York and continue there during the annual election of directors, held on the first Tuesday in December. If occasion ever requires it may then be adjourned to some other city.

The date and place of the Semi-Annual (Spring) Meeting is determined by the Council.

A Business Meeting of the Society is always a part of each of these meetings.

Other Meetings of the Society

In the earlier days of the Society the Annual and Semi-Annual Meetings provided ample opportunities for gatherings of the members. But as the membership increased and spread, additional meetings in different localities were found advisable, and in 1923 the Council established the Regional Meetings. These have developed steadily until now their programs rank in character with those of the Annual and Semi-Annual Meetings. Their papers may deal with those problems of particular importance to the regions in which the meetings are held, where the industries do not come within the classification of any of the existing Professional Divisions of the Society. Such subjects as agriculture, the beet sugar industry, and some phases of the mining and smelting industry can be treated at meetings of this character.

National Divisional Meetings

For those engaged in the established specialties of mechanical engineering the National Meetings of the Professional Divisions, authorized by the Council in 1926, are held in centers where the specialists of the Divisions are present in large numbers.

Conduct of Meetings

In all of the meetings outside the city of New York both the Committee on Meetings and Program and the active Professional Divisions follow the principle that the Local Section in the place of the meeting has an equal responsibility in the conduct of the meeting.

Papers and Discussions for Meetings

That the high standard of the technical meetings may be maintained, papers submitted to the Society should as far as possible present (1) new facts, methods of procedure, or principles of undoubted value; (2) results of intelligently planned, original, experimental researches; (3) important conclusions from known facts regarding any particular subjects reviewed by the author.

The preparation of a technical paper, complete with tables and illustrations, may be a complicated task. A pamphlet of suggestions to authors, which may be had upon application to the Secretary, will be found of considerable assistance, and these, if followed, will greatly reduce the amount of editorial work necessary on a paper, and will expedite its publication.

As the technical sessions are generally arranged in cooperation with the Professional Divisions of the Society, papers may be submitted through the various Divisions or directly to the Secretary of the Society who will refer them to the proper Divisions.

Manuscripts must be submitted at least two months before the meeting at which the paper is to be presented. This allows the time necessary for having them preprinted and distributed for discussion, which is essential to the success of a technical session. Discussion to be valuable must be directly pertinent to the subject of the paper. It should be concise and definite. Its purpose should be either to confirm or to correct, in the light of personal experience, definite results or conclusions which the author of the paper has presented.

PUBLICATIONS

The Society's publications, the most obvious service to the member, perform an important function in carrying out the purposes of the Society. They announce and record its activities, technical and professional, completed or proposed; they are the means of communication between the active committees and the remainder of the membership, as well as the source of information and inspiration in carrying out the broad program of the Society.

The personnel of the Publications Committee, which has supervision of publications, is given on page 58.

Transactions

The Transactions, containing selected papers and discussions presented at meetings of the Society and of its Divisions and Local Sections, is issued in sections. The material is grouped according to the special interests of the Professional Divisions of the Society, and distributed on the basis of registration in Professional Divisions. Members with varied interests are permitted to register in a maximum of three Divisions, and receive the Sections of Transactions covering those Divisions. Synopses of all papers appear in current issues of *Mechanical Engineering* and individual copies may be obtained upon request.

Mechanical Engineering

Mechanical Engineering, published monthly, contains original contributions, addresses, papers, and discussions presented or to be presented at meetings of the Society, and of current value; abstracts of the Transactions papers of more general interest; editorials by engineers upon subjects of timely interest; abstracts of important articles appearing in current issues of the world's technical press; The Engineering Index, a well-known technical service; the Conference Table, a department designed to allow members to exchange information and opinions with other members; correspondence on matters of engineering interest; synopses of all papers appearing in the Professional Division Sections of Transactions; notes of the Engineering Societies Library, book notices, reviews by experts, etc.

Mechanical Engineering is mailed to every member in good standing on the twenty-fifth of the month preceding the month of issue.

A.S.M.E. News

The *A.S.M.E. News,* published semi-monthly, is a convenient method of informing members upon all current Society matters, including activities of Council, Committees, Professional Divisions, and Local Sections, members' correspondence, candidates for membership, positions and engineers available, etc.

The *News* is issued to members in good standing on the seventh and twenty-second of each month.

Record and Index

The Record and Index is published each year and distributed to all members in good standing on the thirty-first day of December of that year. For information as to the scope of the book, reference is made to the contents of the present volume.

Membership List

A Membership List, formerly issued as the Year Book, is issued in February of each year to every member in good standing who requests it, and contains the list of members arranged geographically and alphabetically, corrected to the first of January.

Condensed Catalogues of Mechanical Equipment

Condensed Catalogues is published annually and mailed about September 30 of each year to all members in good standing. It contains a catalogue of mechanical equipment, classified into eleven main groups and arranged alphabetically according to manufacturers; a complete alphabetical subject directory to manufacturers of mechanical equipment; and a classified list of consulting engineers.

Biographies

Subscription editions of the lives of several engineers have been offered to members of the Society during the past few years. These books constitute important additions to the literature of the profession. The titles and dates of issue are as follows:

1912—Autobiography of John Fritz
    (Trade Edition by John Wiley & Sons)
1921—A Life of George Westinghouse, by Henry G. Prout
    (Trade Edition by Charles Scribner's Sons)
1923—Frederick W. Taylor, by Frank Barkley Copley
    (Trade Edition by Harper & Brothers)
1924—John A. Brashear, an Autobiography
    (Trade Edition by Houghton Mifflin Company)
1925—John Edson Sweet, by Albert W. Smith
1927—A Biography of Walter Craig Kerr, by Albert W. Smith
1928—John Stevens—An American Record, by Archibald Douglas Turnbull
    (Trade Edition by The Century Co.)

The Engineering Index

The Engineering Index Service offers weekly in card-index form, concise digests of domestic and foreign technical periodicals covering every phase of engineering activity. Approximately 1,700 publications representing 37 countries and published in 18 languages are reviewed each week by a staff of experts operating under the supervision of the Publications Committee. In addition to the card service the complete Index appears in book form each year.

Reprints, Reports, Codes, Etc.

Members may obtain from the Publication-Sales Department of the Society lists giving titles and prices of the various publications that are on sale to members and others who desire them. These publications include reprints of papers presented before the Society, usually with the discussion, and reports of technical committees, including the Boiler Code, Power Test Codes, Safety Codes, and Standards.

PROFESSIONAL DIVISIONS

A Professional Division is an organization of members of the Society on the basis of common interest in a branch of engineering within the scope of the Society.

A Professional Division's principal function is the presenting and stimulating of developments in mechanical engineering in its field, principally through a four-point program of activities. (*a*) National Division Meetings; (*b*) Sessions at Society Meetings; (*c*) Annual Progress Report; and (*d*) Surveying for Research.

Membership

Any member of any grade may register in not more than three Professional Divisions. He will be kept informed of the activities of all Divisions by means of the publications and meetings of the Society, and will receive automatically the sections of Transactions containing all printed papers of the Divisions in which he has registered. Other papers may be secured upon request. Those who register in a Division should render active service in the Division.

Organization

The Standing Committee on Professional Divisions, listed on page 58, is the point of contact for the Divisions with the Council and with each other. It exercises general supervision over the work of all Divisions.

Each Division has an Executive Committee which is its administrative body. This committee consists of five members, each appointed for five years by the President of the Society, one member retiring each year. The Executive Committee plans the work of the Division, appoints such sub-committees as may be necessary to carry out the purposes of the Division, and directs their work. A list of the Professional Divisions, with the names of the chairmen of their Executive Committees, is given on page 62. The complete personnel of the executive committees and sub-committees of the Professional Divisions for 1928 was given in the Membership List for that year.

Four-Point Program of Activities

NATIONAL MEETINGS

The Professional Divisions are authorized to conduct National Meetings of the Divisions in coöperation with the Local Sections in the place of the meetings and the Committee on Meetings and Program. Such meetings are intended to give all members of the Society who have a common interest in some particular phase of engineering the opportunity to meet and discuss the problems arising in that field.

SESSIONS AT SOCIETY MEETINGS

It is one of the duties of the Professional Divisions, in cooperation with the Committee on Meetings and Program, to aid in arranging the technical sessions for Annual, Semi-Annual, and other meetings which are functions of the Society as a whole. The Divisions also aid Local Sections in securing speakers and writers on specialized technical topics and those of general interest within the field of the Division.

ANNUAL PROGRESS REPORTS

Each Division prepares annually a Progress Report which gives an accurate account of mechanical engineering developments in its field. These Progress Reports are presented at the Annual Meeting, and furnish information upon which a future program can be developed.

SURVEYING FOR RESEARCH

Each Professional Division conducts, usually through a subcommittee, a survey of its field as to the need of research, standardization, and test codes. A Division is in a position to learn of the existing gaps in knowledge, and the steps that are under way to fill these gaps.

Where a particular project appears desirable, it is the duty of the Division to demonstrate the need for it, canvass the personnel and research laboratories which should be interested in it, and cooperate with the Standing Committee on Research in presenting a definite project to the Council.

General Service

Each Professional Division endeavors to have active cooperative relations with other technical societies or trade associations touching on the field of the Professional Division so as better to coordinate activities in its field. Many Divisions have other functions, in the form of general service to the public or to the engineering profession. Excellent examples of this are: the smoke abatement work of the Fuels Division and the elimination of waste campaign of the Management Division.

LOCAL SECTIONS

A Local Section is an organization of the members of the Society in a given territory whose objects are to promote the professional ideals of the Society, as well as to stimulate personal contact and acquaintanceship among the members in the territory.

In 70 important industrial centers throughout the country the members have now organized Local Sections, as listed on pages 63-64. The 1928 personnel of the executive committees, date of organization, meeting place, affiliated organizations and other data regarding each of the localities where Sections are established, were given in the 1928 Membership List. The personnel of the Standing Committee on Local Sections, which has supervision of the Local Sections throughout the country, appears on page 59.

In addition to their professional and social activities, these Sections participate in the government of the whole Society. In electing officers of the Society, each Section selects a delegate to a Conference of Local Sections' Delegates held during the Annual Meeting in New York, at which the Regular Nominating Committee is selected.

Each Section is allotted a territory dependent upon the population and geography of the portion of the country in which it is situated. The membership of the Section selects by vote an executive committee and other officers. This executive committee, or the chairman thereof, has the power of appointing sub-committees. The activities of the Section are financed through an appropriation from the funds of the Society.

Members of the Society, no matter where located, are assigned to Local Sections without being obligated to pay dues in addition to those of the Society. Dues which may be assessed by Sections themselves on their members to provide for greater activities are not mandatory.

Organization of a New Section

After obtaining the Council's approval of a Section, a group of members call for an organization meeting of all members of the A.S.M.E. of the locality, and temporary officers are chosen to take charge of the Section's activities.

CONTACTS AND ACTIVITIES

Through the Sections, the activities of the Society are brought to the door of the members. Through local sub-committees there is opportunity for contact with all of the units of the Society, including its various Professional Divisions, Student Branches, technical committees engaged in research, standardization, and the development of codes outlining standard professional practice, etc. Incidentally, through the Sections, opportunities are provided for contact with the activities of other organizations and societies, such as the American Engineering Council, National Research Council, the preparedness movement of the Army and Navy of the United States, and professional allied organizations. Participation is also afforded in engineering movements of a national character, such as laws for the licensing and registering of engineers.

LOCAL ENGINEERING SOCIETIES

With the multiplicity of engineering organizations, Local Sections are encouraged to affiliate with local engineering societies in order to avoid a duplication of effort and conflict in meeting dates, and at the same time enable the national societies through their respective local sections in the various cities of the country to support both morally and financially the development of local engineering activities. This procedure provides concerted action in each community by engineers of all branches of the profession.

MEETINGS

With the great increase in the number of members of the Society all over the United States, the need for more than two yearly meetings of national importance has become evident. This has resulted in the authorization of Council of other meetings of the Society similar to the Annual and Semi-Annual Meetings, and partially financed from national funds. The several Local Sections of any region where such a meeting is held cooperate in the development of its program and appoint a special local committee to conduct the meeting, as a sub-committee of the Committee on Meetings and Program.

Each Local Section also holds its own regular meetings, as well as joint meetings with Student Branches or other engineering organizations in its vicinity.

STUDENT BRANCHES

A group of students of mechanical engineering in a school or college of accepted standing may petition the Council for the formation of a Student Branch of the Society or for the affiliation of an established student engineering society with the A.S.M.E. Mechanical engineering students in such societies, as well as members of Student Branches, shall be regarded as Student Associates of the A.S.M.E. A student in an engineering college or technical school where there is no Student Branch may be accepted as an Enrolled Student of the Society.

The object of the formation of Student Branches is to enable the engineering student to obtain a conception of the organization and operation of engineering societies, and therefore, outside of a few simple rules, Student Branches enjoy almost complete autonomy.

A Student Branch may be established in an engineering school which has the following requirements: A preparation for entrance of four years at high school or its equivalent; an adequate staff for teaching mechanical engineering; at least one member of the faculty a member of the Society; an equipment of buildings and laboratories sufficient to make possible a responsible professional course in mechanical engineering; a course of studies covering all subjects ordinarily required to enable a graduate to begin a career in engineering.

Activities and Privileges

Student Branches have opportunity to cooperate in a number of the Society's activities. They are encouraged to hold joint meetings with other Student Branches or with Local Sections of the Society in their vicinity. Student Associates are accorded the same privileges as A.S.M.E. members in the matter of securing a discount on publications purchased from the Society. In order to encourage the writing and presenting of papers by students, the Society, through the generosity of two of its members, has been able to offer each year awards, accompanied by certificates of award, for the best papers submitted by Student Associates.

The meetings of the Branch afford the Student an opportunity for the development of the art of public speaking on engineering subjects. He also has the privilege of wearing a student pin, combining the Society's official badge and the colors and initials of his college, and of using a membership card for introduction to engineering plants where members of the Society may be in authority and to serve as a means of identification at engineering meetings and elsewhere. He enjoys the privilege of attending the general meetings of the Society, going on excursions, and participating in other invitation features afforded to regular members. Upon graduation, he is assisted in securing employment and forming contact with engineers of the United States or other countries.

The personnel of the Committee on Relations with Colleges, which has supervision of the Student Branches under the direction of the Council, is given on page 59. The list of Student Branches, numbering ninety-three, with the names of their honorary chairmen for 1928, appears on pages 64-66.

AWARDS

The Committee on Awards, given on page 59, has supervision of the awards of the Society under the direction of the Council. Awards and special funds are administered as specified in the deeds of gift or as may be determined by the Council from time to time. The following awards come within the jurisdiction of the Society:

Honorary Membership, to which persons of acknowledged professional eminence are elected by unanimous vote of Council under the provisions of the By-Laws and Rules. A list of honorary members is given on page 76.

Life Membership, which may be conferred by the Council for distinguished service to the Society.

A.S.M.E. Medal, established by the Society in 1920 to be presented for distinguished service in engineering and science. May be awarded for general service in science having possible application in engineering.

Holley Medal, instituted and endowed in 1924 by George I. Rockwood, Past Vice-President of the Society, to be bestowed for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit.

Melville Medal, established in 1914 by the bequest of Rear-Admiral George W. Melville, Honorary Member and Past-President of the Society, to be presented for an original paper or thesis of exceptional merit, presented to the Society for discussion and publication, to encourage excellence in papers. May be presented annually.

Junior Award, annual cash award of $50, established in 1914, from a fund created by Henry Hess, Past Vice-President of the Society, to be presented, together with an engraved certificate, for the best paper or thesis submitted by a Junior Member.

Student Awards, two annual cash awards of $25 each, established in 1914, from a fund created by Henry Hess, Past Vice-President of the Society, to be presented, together with engraved certificates, for the best papers or theses submitted by Student Associates.

Charles T. Main Award, annual cash award of $150, established in 1919 from a fund created by Charles T. Main, Past-President of the Society, to be awarded to a student of engineering, preferably a member of a Student Branch of the Society, for the best paper within the general subject of the "Influence of the Profession upon Public Life." The exact subject is assigned by the Committee on Awards, subject to the approval of the Council, and is announced each September through the Honorary Chairmen of the Student Branches.

SCHOLARSHIPS

Max Toltz: Endowment Fund of $15,000 established by Major Max Toltz, former member of the Council of the Society, the income to be used for assistance to students.

John R. Freeman: Fund of $25,000 established in 1926 by John R. Freeman, Past-President of the Society, the income to be used for travel scholarships and research.

Woman's Auxiliary: Scholarship or Fellowship offered by the Woman's Auxiliary to the Society to assist sons and daughters of members or worthy students of mechanical engineering.

The names of the recipients of the different awards to date are given in the following lists, together with the dates of presentation, and the services or papers for which the awards were made. There were no awards for the years not listed.

A.S.M.E. Medal

1921 Hjalmar Gotfried Carlson, "in recognition of the services rendered the Government because of his invention and part in the production of 20,000,000 Mark III drawn steel booster casings used principally as a component of 75-mm. high-explosive shells, but also extensively in gas shells and bombs."

1923 Frederick Arthur Halsey, "for his paper describing the premium system of wage payments presented before the Society at the Providence Meeting in 1891, as the adoption of the methods there proposed has had a profound effect toward harmonizing the relations of worker and employer."

1923 John Ripley Freeman, "for his eminent service in engineering and manufacturing by his meritorious work in fire prevention and the preservation of property."

1926 R. A. Millikan, "in recognition of his contributions to science and engineering."

1927 Wilfred Lewis, "for his contributions to the design and construction of gear teeth."

1928 Julian Kennedy, "for his services and contributions to the iron and steel industry."

Holley Medal

1924 Hjalmar Gotfried Carlson, "for his inventions and processes which made possible the timely production of drawn steel booster casings for artillery ammunition, thereby aiding victory in the World War."

1928 Elmer Ambrose Sperry, "for achievements and inventions that have advanced the naval arts, including the gyroscope that has freed navigation from the dangers of the fluctuating magnetic compass."

Melville Medal

1927 Leon P. Alford. "for his paper on 'Laws of Manufacturing Management.'"

Junior Award

1915 Ernest O. Hickstein, "Flow of Air through Thin Plate Orifices"

1916 L. B. McMillan. "The Heat Insulating Properties of Commercial Steam-Pipe Coverings"

1919 E. D. Whalen, "Properties of Airplane Fabrics"

1921 S. Logan Kerr, "Moody Ejector Turbine"

1922 R. H. Heilman, "Heat Losses from Bare and Covered Wrought-Iron Pipe at Temperatures up to 800 Degrees Fahrenheit"

F. L. Kallam, "Preliminary Report on the Investigation of the Thermal Conductivity of Liquids"

1923 S. S. Sanford and S. Crocker. "The Elasticity of Pipe Bends"
1924 R. H. Heilman, "Heat Losses through Insulating Material"
1925 Gilbert S. Schaller, "An Investigation of Seattle as a Location for a Synthetic Foundry Industry"
1927 Wm. M. Frame, "Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressure"
1928 M. D. Aisenstein, "A New Method of Separating the Hydraulic Losses in a Centrifugal Pump"

Student Award

1916 Boynton M. Green, Stanford University "Bearing Lubrication"
Howard E. Stevens, Rensselaer Polytechnic Institute, "An Investigation of the Dynamic Pressure on Submerged Flat Plates"
M. Adam, Louisiana State University, "The Adaptability of the Internal Combustion Engine to Sugar Factories and Estates"
1917 H. R. Hammond and C. W. Holmberg, Pennsylvania State College, "Study of Surface Resistance with Glass as the Transmission Medium"
1919 C. F. Leh and F. G. Hampton, Stanford University, "An Experimental Investigation of Steel Belting"
W. E. Helmick, Stanford University, "An Experimental Investigation of Steel Belting"
1920 Howard G. Allen, Cornell University, "Wire Stitching through Paper"
1921 Karl H. White, University of Kansas, "Forces in Rotary Motors"
Richard H. Morris and Albert J. R. Houston, University of California, "A Report upon an Investigation of the Herschel Type of Improved Weir"
1923 Charles F. Olmstead, University of Minnesota, "Oil Burning for Domestic Heating"
H. E. Doolittle, University of California, "The Integrating Gate: a Device for Gaging in Open Channels"
1924 George Stuart Clark, Stanford University, "Two Methods Used for the Determination of the Gasoline Content of Absorption Oils in Absorption Plants"
L. J. Franklin and Charles H. Smith, Stanford University, "The Effect of Inaccuracy of Spacing on the Strength of Gear Teeth"
1925 Harry Pease Cox, Jr., Rensselaer Polytechnic Institute, "A Study of the Effect of End Shape on the Towing Resistance of a Barge Model"
W. S. Montgomery, Jr., and E. Ray Enders, Jr., Pennsylvania State College, "Some Attempts to Measure the Drawing Properties of Metals"
1926 R. E. Peterson, University of Illinois, "An Investigation of Stress Concentration by Means of Plaster of Paris Specimens"
Cecil G. Heard, University of Toronto, "Pressure Distribution over U. S. A. 27 Aerofoil with Square Wing Tips Model Tests"
1927 Alfred H. Marshall, Princeton University, "Evaporative Cooling"
Roger Irwin Eby, University of Washington, "Measurement of the Angular Displacement of Flywheels"
1928 Clarence C. Franck, Johns Hopkins University, "Condition Curves and Re-heat Factors for Steam Turbines"

Charles T. Main Award

1925 Clement R. Brown, Catholic University of America. Subject: "The Influence of the Locomotive on the Unity of the United States"
1926 W. C. Saylor, Johns Hopkins University. Subject: "The Effect of the Cotton Gin upon the History of the United States during Its First Seventy Years"
1927 No award. Subject: "Scientific Management and Its Effect upon the Industries"
1928 Robert M. Meyer, Newark College of Engineering. Subject: "Scientific Management and Its Effect upon Manufacturing"

RESEARCH

Purpose

Research in science and engineering is fast coming to be recognized as one of the most important factors affecting industrial progress. Since the Society's members are closely connected with and are leaders in this industry, it is natural that the A.S.M.E. should take an active part in the initiation and support of cooperative research in the mechanical engineering field. It can be particularly helpful in sponsoring those problems in applied research which are so widespread in application that no single firm feels justified in supplying the funds which should come from all those that would ultimately benefit. While the Society's limited research budget does not permit of grants for the actual conduct of specific research projects, a stimulating and helpful influence is exerted through committee activity. To enumerate, the following important functions may be exercised: (*a*) act as a clearing house for the dissemination of research information; (*b*) coordinate existing research where possible, thus eliminating waste due to the duplication of effort; (*c*) organize and conduct cooperative research work on problems of both a fundamental and applied nature in engineering and industry; and (*d*) develop ways and means of assisting in the education and training of research workers for industry.

Development of A.S.M.E Research Activities

More than twenty years ago the Society added research to the list of its activities. At that time a Research Committee was established by the Council and under its financial control. As time went on its organization and procedure gradually took on definite form and new possibilities for service developed. Special committees were formed to investigate specific problems.

It was not until the end of the World War, however, that a separate budget item for research was established by the A.S.M.E.

Council. Since that time approximately $56,000 has been expended by the Main Research Committee in the development and organization of Special and Joint Research Committees and in other research activities. The success of its methods is attested to by the fact that in that time an additional $176,000 has been raised from industry and other sources by its committees for the support of their work, a ratio of nearly four dollars to one.

ORGANIZATION AND PROCEDURE

Organization. The research activities of The American Society of Mechanical Engineers are organized and directed by a Standing Committee of the Council, the governing body of the Society, officially known as the A.S.M.E. Main Research Committee. The personnel of this committee is given on page 59.

The Council makes an annual appropriation for research from the funds of the Society and this money is used by the Main Research Committee to initiate, organize, and foster Special Research Committees whose problems cover the various fields of mechanical engineering and allied industries. A list of these special committees is given on pages 66-67. A small staff is maintained to assist in the detailed work of the Main Committee.

Program. The research program of the Main Committee is made up of projects which are originated by certain individuals or groups, the Main Committee itself, other technical committees of the Society, such as on Standards, Safety, and Power Test Codes, or the recently formed Survey Committees of the A.S.M.E. Professional Divisions. It is the function of these Survey Committees to canvass the needs of their particular field for research and to bring these needs to the attention of the Main Research Committee in the form of definitely outlined research projects which will advance the art of mechanical engineering and will commend themselves to financial support by industry.

Procedure. Following the authorization of a proposal as an A.S.M.E. research project by the A.S.M.E. Council, the Main Committee organizes a Special Research Committee of interested and qualified individuals both from among those industries which have already indicated their interest in the project and from among those individuals whose knowledge and experience particularly fit them to advise on the technical aspects of the committee's activities. Membership and work on these committees are entirely voluntary and are not limited to those who hold membership in the A.S.M.E. Each Special Committee acts as a clearing house of information on its particular subject, maps out an investigational program, carries on a financial campaign throughout the interested industries for support of its projects, and employs and supervises the work of research fellows who are established in university, government, or industrial laboratories.

Cooperation with Other Research Agencies

Oftentimes research can be most effectively undertaken through the joint efforts of several technical societies. Where greater effectiveness seems assured, therefore, this Society joins with other technical organizations in the sponsorship of such a project. Close contact with the National Research Council and Engineering Foundation is maintained through A.S.M.E. membership on the boards of these research agencies.

STANDARDIZATION

Purpose

The growth of the standardization activities of the Society has been a direct result of the demand for engineering and industrial standards and for information about them on the part of our membership. This department endeavors to encourage the development of standards in the mechanical engineering field, to assist in this work through the organization and activity of representative committees, and to keep the members of the Society fully informed concerning all standards activity.

Brief Historical Note

The early records of the Society show that five years after it was founded (1885) a Standardization Committee on Pipe and Pipe Threads was appointed. This Committee made its report the following year and from that time standards committees have been almost continuously at work. In 1892 the first report on the standardization of pipe flanges was published. It was revised and republished in 1900 and was again revised and extended during the years 1912-1914 and 1916-1918. As far back as 1901 another committee of the Society developed and printed a complete standard for pipe unions.

In the early days before the organization of the American Society for Testing Materials, the Society had committees at work developing standard tests and methods of testing materials. The first report of this kind was published in 1890.

The standardization of screw threads has received the attention of numerous committees, the first of which reported in 1907 on standard proportions for machine screws. Special threads for electric fixtures and fittings were covered by two reports published in 1915, and three years later (1918) a comprehensive report appeared on the standardization of limits and tolerances in screw-thread fits. Finally this preliminary work had its culmination in the report of the Sectional Committee on the Standardization and Unification of Screw Threads which was published in 1924 under the title Screw Threads for Bolts, Machine Screws, Nuts and Commercially Tapped Holes.

The diversity of the Society's interest in the field of standardization is shown by the fact that the list of standards developed by its early committees includes those for pipe threads; abbreviations, symbols, punctuation, etc., in technical papers (1904); code for identification of power-house piping (1911); catalogue sizes (1913); pipe-thread gages (1913); mechanical filters (1916); and standards for graphic presentation (1917).

With the establishment of the American Engineering Standards Committee (now the American Standards Association), the scope of the Society's activities in Standardization were broadened to include such projects as Shafting Diameters and Keys, Metal Fits, Ball Bearings, Gears, Screw Threads, Pipe Flanges and Fittings, Bolt, Nut and Rivet proportions, Small Tools and Machine Tool Elements, Drawings and Drafting-Room Practice, Wire and Sheet Metal Gages, Wrought Iron and Wrought Steel Pipe and Tubing, and Electric Motor Frame Dimensions.

Organization and Function of American Standards Association

The American Engineering Standards Committee, organized in 1918, and reorganized in 1928 as the American Standards Association, serves as the national clearing house for engineering and industrial standardization, acts as the official channel of cooperation in international standardization, and provides an information service on engineering and industrial standardization matters. The ultimate responsibility for and control of the work rests with the forty national organizations whose representatives constitute the Standards Council. The Society is one of these member bodies, having been one of the five founder societies; the names of its representatives on the A.S.A. will be found on page 74.

The A.S.A. approval of a given standard means that a national consensus has been reached. It is, therefore, the agency through which industrial standardization in this country is passing from standardization by associations, societies, and governmental agencies, to standardization on a national scale. Through its method and procedure, which are the result of extensive study and discussion on the part of the numerous bodies concerned, and which have been further developed through years of experience, the standardization work of the many bodies concerned is being broadened and unified into a system of creating national industrial standards.

A.S.M.E. STANDARDS ORGANIZATION

Realizing the growing importance of this branch of the Society's activity the Council in 1911 created the standing Committee on Standardization and placed at its head that pioneer in this field, Henry Hess, who served until his death. It is the duty of this Committee to receive all proposals for the development of standards, to initiate projects, to keep the Council fully informed on standardization matters of interest to A.S.M.E. members in general, and to organize and pass on the work of the Sectional Committees which now function under the procedure of the A.S.A. The personnel of the standing committee for 1928 appears on page 59 and a list of sectional and sub-committees on pages 67-71.

RELATIONS WITH OTHER A.S.M.E. ACTIVITIES

Through the pages of *Mechanical Engineering* the Committee on Standardization endeavors to keep the membership fully informed on the developments in its field in the United States and foreign countries. One of the steps in the procedure for approving reports, standards, and codes by the Society requires their publication in *Mechanical Engineering* in full or in abstract. In addition to this publicity, hearings on certain important standards or codes are often called.

FINANCIAL SUPPORT

The small annual appropriations which are made for standardization serve to cover only the executive work necessary for the carrying through of the various projects for which the Society has accepted sponsorship or joint sponsorship, and to take care of the necessary correspondence and clerical work.

It is accordingly necessary at times for the Main Committee to call on the manufacturers and principal users of a product undergoing standardization for assistance in covering the incident expenses. A notable example of this is the contribution of $2000 by the bolt, nut and rivet manufacturers for the support of the activities of the Sectional Committee on the Standardization of Bolt, Nut and Rivet Proportions.

POWER TEST CODES

SCOPE OF THE CODES

The purpose of the Power Test Codes is to provide standard directions for conducting and reporting performance tests of power-plant and heat apparatus, such as are most commonly undertaken in connection with commercial transactions. They are sufficiently comprehensive to apply to tests which determine all the details of the performance, but selected parts of these Codes may be used for tests of limited scope. They apply further to tests which concern the fulfilment of performance guarantees, and to acceptance tests.

The Codes are not intended to supply directions for general research or the development of equipment or of processes, but to assist the engineer who is concerned with research to proceed as nearly as practicable in harmony with their requirements and, in the publication of results, to employ forms of presentation which will be comparable with those of the Codes.

Historical Note

In 1886 a committee was appointed to formulate a code entitled a Standard Method for Steam Boiler Trials which soon became the standard practice of the profession and the basis upon which performance guarantees were drawn and settled. At that time there were no other recognized rules for practice extant in this country. This A.S.M.E. Code was revised in 1899 and has since undergone several other revisions made necessary by the progress of the art. The Institution of Civil Engineers of Great Britain appointed a similar committee on Tabulating the Results of Steam Engine and Boiler Trials in 1897, and its report, made in 1902, is now under revision by a Joint Committee of the Institutions of Civil and Mechanical Engineers.

Test Codes for prime movers soon followed. The Standard Method of Conducting Duty Trials of Steam Pumping Engines was published in 1891, the Code for Locomotive Tests appeared in 1893, and the report on a Standardized System of Testing Steam Engines was published in 1902.

Revision of Codes

A comprehensive and thorough revision and extension of the A.S.M.E. Test Codes was begun in 1909 and completed and published in 1915. This group of Test Codes is entitled Rules for Conducting Performance Tests of Power-Plant Apparatus, and covers the testing of boilers; reciprocating steam engines; steam turbines; pumping machinery; compressors, blowers and fans; complete steam-power plants; locomotives; gas producers; gas and oil engines; and water-wheels.

In the fall of 1918 the Council, realizing the need for a further revision and extension of these Test Codes, created a Standing Committee of 25 men for this purpose. This Main Committee with its 20 associated Individual Committees was organized in December of that year. (See pages 60 and 71-72).

Plan of Committee Organization

The Main Committee formulates the plan and scope of the work, determines what codes should be developed, nominates persons for appointment by the President as members of the committees charged with the development of the individual codes, and suggests revisions if necessary to correlate their work with that of the other committees and with the general plan. When a Code submitted by an Individual Committee is complete and satisfactory to American industry, the Main Committee transmits it to the Council with its recommendations, and when approved by the Council the Code is published as the A.S.M.E. Code on that particular subject over the signatures of the members of the individual committee which formulated the Code and becomes the standard practice of the Society. Dr. Fred R. Low (Past-President) is the chairman of this Standing Committee.

The members of the individual committees have been selected with special reference to their knowledge of the various subjects, as it is the Society's expectation that the codes when issued will embody the best thought and experience of the profession. The choice of members has not been confined to men who are members of the Society. Knowledge of the subject is considered more important than society affiliation. As the members of the Individual Committees are widely distributed geographically, a great part of their work is carried on by correspondence.

The committees are favored by the cooperation of other societies. For example, the Committee on Centrifugal and Turbo-Compressors and Blowers, in the development of its Code, has had the full cooperation of the American Society of Heating and Ventilating Engineers and the National Association of Fan Manufacturers; the Committee on Refrigerating Systems is identical in its membership with the committee appointed for a similar purpose by the American Society of Refrigerating Engineers; and the Mechanical Division of the American Railway Association is officially represented on the Committee on Locomotive Tests. Other individual committees include representatives from the U. S. Bureau of Standards, the U. S. Naval Academy Testing Station, the U. S. Bureau of Mines, the Machinery Builders Society, and the Hydraulic Society.

The Individual Committees have chosen their own officers and have perfected their own organization. They are free to seek the cooperation of every individual and organization having information upon or interest in their respective Codes, especially those whose interests will be affected by these Codes. The Committee on Reciprocating Steam Engines, for example, wrote to 120 engine builders, telling them that the Steam Engine Code was to be revised, and solicited their suggestions and interest. The committees may avail themselves also of the cooperation of other societies or committees interested in their Codes. Should they desire to add to their membership or to invite an organization to participate in their work by the appointment of representatives upon their committees, recommendations are made to the Main Committee, which transmits such recommendations to the Council for invitations or appointments.

Progress of Work

The Test Codes which have been completed to date are those on

General Instructions
Definitions and Values
Solid Fuels
Stationary Steam Boilers
Reciprocating Steam Engines
Steam Turbines
Reciprocating Steam-Driven Displacement Pumps
Centrifugal and Rotary Pumps
Displacement Compressors and Blowers
Condensing Apparatus
FeedwaterHeaters
Refrigerating Systems
Evaporating Apparatus
Steam Locomotives
Gas Producers
Internal-Combustion Engines
Hydraulic Power Plants and Their Equipment
Speed-Responsive Governors
Instruments and Apparatus:
  Part 1, General Considerations
  Part 21, Leakage Measurement; Chapter 1, Condenser Leakage Tests

Other Codes being revised or developed for the first time are

Liquid Fuels
Gaseous Fuels
Centrifugal and Turbo-Compressors and Blowers
Complete Steam-Electric Power Plants
Water-Cooling Equipment
Instruments and Apparatus (40 Parts and Chapters)

International Relations on Power Test Codes

The present Committee on Power Test Codes is exchanging preliminary and final drafts of its Codes with the British Institutions of Civil and Mechanical Engineers for the purpose of securing criticism and comment. It is hoped that through such a procedure agreements may be secured between the British and American Codes on the important sections of each. Code work in Great Britain is being carried forward by a joint committee composed of four members each of nine technical societies of England and Scotland.

The World Power Conference held at Wembley, London, in June and July, 1924, was attended by a number of the members of the A.S.M.E. Committee on Power Test Codes and afforded an additional opportunity for conference. Taking advantage of the presence of these gentlemen in London the Institutions of Civil and Mechanical Engineers arranged for meetings of their joint committees to consider preliminary drafts of the Test Codes for Hydraulic-Power Plants, Boilers and Heat Engines.

Stimulated by the interest shown at the World Power Conference in the development of international test codes for prime movers the International Electrotechnical Commission is laying plans to employ its machinery to bring about as much unity as possible among the recognized prime-mover test codes of the several countries. A standards publication in the series on " Prime Movers for Electrical Plants " entitled " Nomenclature of Hydraulic Turbines " was published by the I.E.C. in July, 1914. Since that time similar material applying to other prime movers has been developed by the several national committees and circulated by the Central Office of the I.E.C.

In America the U. S. National Committee of the I.E.C. has recognized the A.S.M.E. Committee on Power Test Codes as the group best able to prepare American proposals in the form of test codes for prime movers. It accordingly appointed Dr. W. F. Durand and Dr. Fred R. Low its Chief Advisors on Hydraulic and Steam Turbines, respectively.

Following the April, 1926, meeting of the I.E.C. in New York at which the U. S. National Committee was designated as the Secretariat of the I.E.C. Advisory Committee No. 4 on Prime Movers, Dr. Fred R. Low, Chairman of the A.S.M.E. Committee on Power Test Codes, was named Director of the Secretariat. At the September, 1927, meeting of the I.E.C. in Bellagio, Italy, the Advisory Committee on Prime Movers was divided into two committees, Advisory Committee No. 4 on Hydraulic Turbines and Advisory Committee No. 5 on Steam Turbines. The U. S. National Committee, therefore, now holds the Secretariats for both of these committees in addition to the Secretariats for Nomenclature and the Rating of Rivers.

SAFETY

Purpose and Policy

The interest of the members of The American Society of Mechanical Engineers in this subject springs from at least four sources: (*a*) close association with the rapid development of manually operated and automatic machinery; (*b*) growing appreciation of the importance of the science of management to industry and the direct bearing of safety to health, life and limb on successful operation in industrial plants; (*c*) the realization of the superiority of built-in guards and the dependence of their general adoption on the national safety-code movement; and (*d*) economic considerations which affect in a general way the life and happiness of the various communities of the country. The Society is one of the pioneer organizations at work in this field, feeling a special sense of obligation to have regard for the welfare of human life as an essential part of its engineering achievement.

Brief Historical Note

In the early part of the last decade several of the states began to include in their laws provisions for the protection and care of industrial workers. Since many of these sets of rules or codes involved knowledge of engineering principles and data, A.S.M.E. members were from time to time urged to assist in their development. This situation led naturally to the formation of certain highly technical safety codes by special committees of the Society. The first of these was published in 1915 and is known as a Safety Code for the Use and Care of Abrasive Wheels. The next year (1916) two codes were completed, namely, Code of Safety Standards for Cranes and Code of Safety Standards for Power-Transmission Machinery. In 1917 appeared a Code of Safety Standards for Ladders and a Code of Safety Standards for Woodworking Machinery.

At the 1915 Annual Meeting, Carl M. Hansen, in a paper on " Standardization of Safety Principles," pointed out that it is through the standardization of safety codes that engineers can play a most important rôle. Among the important characteristics of safety codes are (*a*) high standards, (*b*) comprehensive scope, (*c*) practical provisions, (*d*) simple rules, and (*e*) positive requirements.

Organization and Procedure

In the spring of 1915 the Committee on Meetings appointed a sub-committee on Protection of Industrial Workers. The members of this committee were John H. Barr, Chairman, Melville W. Mix, John Price Jackson, William A. Viall, and John W. Upp. The purpose of this sub-committee was stated as follows: " To take a part in bringing about the standardization of effective and practical protective devices and methods." The Committee on Protection of Industrial Workers was soon made a special committee of the Society and later, in October, 1921, following the publication of the Safety Code for Elevators, one of its most important contributions to engineering and industrial safety, it was discharged.

By this time the promotion of safety had become a major activity of the Society, so it is now supervised by a Standing Committee which consists of five members, one appointed each year for five years. The personnel of this Committee is given on page 60.

CONNECTION WITH A.S.A.

With the organization and satisfactory functioning of the American Standards Association (formerly American Engineering Standards Committee), the A.S.M.E. agreed to carry on all of its safety-code work under the procedure of the A.S.A., on which body the Society has three representatives. It accordingly now holds joint sponsorship for the sectional committees which are formulating the following safety codes:

Safety Code for Elevators
Safety Code for Mechanical Power-Transmission Apparatus
Safety Code on Machinery for Compressing Air
Safety Code for Conveyors and Conveying Machinery
Safety Code for Mechanical Power Control
Safety Code for Cranes, Derricks and Hoists

At the request of the sponsors for other safety codes the Society is represented on twenty-three additional sectional and other committees, which are listed on page 72.

BOILER CODE

PURPOSE

To formulate standard specifications for the construction of steam boilers and other pressure vessels and for their care in service.

BRIEF HISTORICAL NOTE

The Boiler Code Committee was appointed by Col. E. D. Meier, President of the Society in 1911. The first edition, covering power and heating boilers and material specifications, was issued in 1914; and later revised in 1918, 1924, and 1927. The A.S.M.E. Boiler Construction Code now consists of eight sections covering, Power Boilers, Material Specifications, Locomotive Boilers, Heating Boilers, Miniature Boilers, Rules for Inspection, Rules for Care of Power Boilers, and Unfired Pressure Vessels.

PLAN OF COMMITTEE ORGANIZATION

The Main Boiler Code Committee consists of four representatives of steam-boiler owners and users, two of boiler-insurance companies, one of the railways, two consulting engineers, one representative of industry, three of boiler manufacturers, three of technical schools, one of the technical press, two representatives of steel manufacturers, two of heating-boiler manufacturers, one of the state-inspection authority, one of pressure vessel manufacturers, and two members at large. The personnel of the 1928 Committee is given on page 60.

The Conference Committee consists of thirty-six members who are representatives of the state and cities in which the Boiler Code is operative.

The Main Committee is supplemented by nine sub-committees organized to consider the various phases of boiler-construction problems. (See page 73.)

Committee Procedure

The Committee meets monthly for the purpose of answering inquiries and formulating interpretations on the Boiler Code. Its procedure in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and simultaneously published in *Mechanical Engineering*.

National and International Relations

Through cooperation of other organizations, the A.S.M.E. Boiler Construction Code has been adopted in 20 states and 16 cities. In addition, the Committee has cooperated directly with various government departments having authority over steam-boiler construction. It has also cooperated with, and furnished information to boiler-inspection departments and authorities in many foreign countries. Effort is made through cooperation with the Industrial Machinery Division of the Department of Commerce to keep on file complete records of all foreign boiler codes and regulations.

JOINT ACTIVITIES

(For A.S.M.E. representatives on these and other activities, see pages 73-75.)

American Engineering Council

The Federated American Engineering Societies was organized in December, 1920, and its name changed to American Engineering Council in March, 1924. Its object is " to further the public welfare wherever technical and engineering knowledge and experience are involved, and to consider and act upon matters of common concern to the engineering and allied technical professions."

American Engineering Council coordinates the activities of member national societies, state councils, and local and regional affiliations on national matters and affairs that are of general interest.

The A.S.M.E. has one delegate on the American Engineering Council for every one thousand members. Delegates are elected annually by the membership. The President of the Society is the Chairman of the delegation.

American Standards Association

The American Engineering Standards Committee, reorganized late in 1928 as the American Standards Association, is briefly described on page 41. Complete information may be secured from its Secretary, Dr. P. G. Agnew, 29 West 39th Street, New York, N. Y.

Engineering Education

The Society cooperates with educational organizations such as the Society for the Promotion of Engineering Education, on whose Board of Investigation and Coordination it has two representatives.

Matters pertaining to the education of personnel for the industries through agencies other than colleges and engineering schools is in charge of the Society's Committee on Education and Training for the Industries, the personnel of which is given on page 59.

Engineering Foundation Board

The Engineering Foundation was established in 1914 by the Past-President and Honorary Member Ambrose Swasey " for the furtherance of research in science and in engineering, and for the advancement in any other manner of the profession of engineering and the good of mankind."

The Board administers three gifts from Mr. Swasey amounting to about $500,000, the Henry R. Towne Fund of $50,000, and its share of the Edward Dean Adams Fund of $100,000, the income from which is divided equally between the Foundation and the Engineering Societies Library.

Engineering Societies Employment Service

ORGANIZATION

The Four National Engineering Societies—A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E.—conduct jointly the Engineering Societies Employment Service.

The Secretaries of these Societies act as the Board of Managers, and the work in each office is in charge of a Business Manager.

There are at present offices in Chicago, New York, and San Francisco. Members should conduct their business with the nearest office.

BULLETIN SERVICE

Registration of engineers available for positions is restricted to the membership of the participating organizations.

The Service issues a Bulletin each week which contains lists of positions open and is distributed to members of the four societies under first-class postage at a subscription rate of $3.00 per quarter or $10.00 per annum, payable in advance.

In addition to the Employment Bulletin there appear regularly in the publications of the respective societies lists of men and positions available. This is done without charge.

NATIONAL SERVICE

The policy of the Employment Service will be to open additional offices at strategic points as rapidly as finances will permit, and the local groups of members are willing to undertake responsibility for their management. The Chicago Office is conducted jointly with the Western Society of Engineers, and the San Francisco Office jointly with the Engineers' Club of San Francisco and the California Section of the American Chemical Society.

CONTRIBUTIONS FOR SERVICE

In order to make the Service self-supporting, members securing positions are invited to contribute to the expenses of maintaining the Service on the basis of one and one half per cent of the annual salary contracted for; or three per cent of the amount received for temporary positions.

CORRESPONDENCE

Correspondence should be addressed to the office nearest to you as follows—*and not to Society.*

Chicago Office—Engineering Societies Employment Service, 1216 Engineering Bldg., 205 West Wacker Drive, A. Krauser, Manager.
Eastern Office—Engineering Societies Employment Service, 31 West 39th Street, New York, N. Y., Walter V. Brown, Manager.
San Francisco Office—Engineering Societies Employment Service, 57 Post Street, N. D. Cook, Manager.

Forms for registration will be supplied either to employers or members of the societies upon request.

Engineering Societies Library

ADMINISTRATION

The Engineering Societies Library, located at 29 West 39th Street, New York, N. Y., is administered by the Library Board, consisting of four representatives and the secretary of each of the four national engineering societies. The library is in charge of Harrison W. Craver, Director.

The library of the A.S.M.E. is merged with those of the A.S.C.E., A.I.M.E., and A.I.E.E. into the Engineering Societies Library. (See page 59 for personnel of A.S.M.E. Library Committee.)

SERVICE

The library is open from 9 a. m. to 10 p. m. daily (summer months to 5 p. m.) except Sundays and legal holidays.

The Library Service Bureau furnishes technical references, bibliographies, abstracts, copies, translations, etc. Work is done at cost.

The photostat service supplies prints at the cost of 25 cents per sheet.

The loan library loans duplicates and the more recent books to members in any part of the country at the member's risk.

John Fritz Medal Board of Award

The John Fritz Medal was established in August, 1902, by the professional associates and friends of the late John Fritz, Past-President and Honorary Member of the A.S.M.E., to perpetuate the memory of his achievement in industrial progress.

The medal is awarded not more than once each year for notable scientific or industrial achievement, with no restrictions on account of sex or nationality. The award is made by a Board of sixteen, four representatives from each of the four national engineering societies.

The recipients of the John Fritz Medal are given in the following list; there were no awards for the years not listed.

1902 JOHN FRITZ, for scientific and industrial achievement

1905 LORD KELVIN, for work in cable telegraphy and other general scientific achievements

1906 GEORGE WESTINGHOUSE, for the invention and development of the air-brake

1907 ALEXANDER GRAHAM BELL, for the invention and introduction of the telephone

1908 THOMAS ALVA EDISON, for the invention of the duplex and quadruplex telegraph; the phonograph; the development of a commercially practical incandescent lamp; the development of a complex system of electric lighting, including dynamos, regulating devices, underground system, protective devices, and meters

1909 Charles Talbot Porter, for his work in advancing the knowledge of steam engineering and improvements in engine construction
1910 Alfred Noble, for notable achievements as a civil engineer
1911 Sir William Henry White, for notable achievements in naval architecture
1912 Robert Woolson Hunt, for his contributions to the early development of the Bessemer process
1914 John Edson Sweet, for his achievements in machine design; and for his pioneer work in applying sound engineering principles to the construction and development of the high-speed steam engine
1915 James Douglas, for notable achievements in mining, metallurgy, education, and industrial welfare
1916 Elihu Thomson, for achievements in electrical invention, in electrical engineering and industrial development, and in scientific research
1917 Henry Marion Howe, for his investigations in metallurgy, especially in the metallography of iron and steel
1918 J. Waldo Smith, for achievement as an engineer in providing the City of New York with a supply of water
1919 George W. Goethals, for achievement as builder of the Panama Canal
1920 Orville Wright, for achievement in the development of the airplane
1921 Sir Robert A. Hadfield, for the invention of manganese steel
1922 Charles Prosper Eugene Schneider, for achievement in metallurgy of iron and steel, for development of modern ordnance, and for notable patriotic contribution to the winning of the World War
1923 Senator Guglielmo Marconi, for the invention of wireless telegraphy
1924 Ambrose Swasey, for achievement as a designer and manufacturer of instruments and machines of precision, a builder of great telescopes, a benefactor of education, the founder of the Engineering Foundation
1925 John Frank Stevens, for great achievements as a civil engineer, particularly in planning and organizing for the construction of the Panama Canal; as a builder of railroads, and as administrator of the Chinese Eastern and Siberian Railways
1926 Edward Dean Adams, for great achievements as engineer, financier, scientist, whose vision, courage and industry made possible the birth at Niagara Falls of hydroelectric power
1927 Elmer Ambrose Sperry, for the development of the gyro-compass and application of the gyroscope to the stabilization of ships and aeroplanes
1928 John J. Carty, for pioneer achievement in telephone engineering and in the development of scientific research in the telephone art

Joint Conference Committee

The Presidents and Secretaries of the A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E. constitute the Joint Conference Committee. This committee was authorized in January, 1924, by the boards of direction of the four national engineering societies to formulate a permanent workable method of cooperation on public affairs and other matters of common interest, and assisting in cementing the friendship between American and foreign engineers, and to report its recommendations to the several boards.

UNITED ENGINEERING SOCIETY

The United Engineering Society was organized on May 11, 1904, when a bill authorizing such a Society was signed by Governor Odell of New York. It is an incorporated board of twelve trustees, three each from the four national engineering societies. One trustee is appointed each year by the governing board of each society, for a term of three years. The Engineering Societies Building, which is the joint property of the four societies, is administered by the Board of Trustees of the United Engineering Society.

WASHINGTON AWARD COMMISSION

The Washington Award was founded in 1916 by John Watson Alvord, to be awarded annually by the Western Society of Engineers upon the recommendation of a Commission composed of nine representatives of that society and two representatives of each of the four national engineering societies, the A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E. It is bestowed in recognition of devoted, unselfish, and preeminent service in advancing human progress through engineering. The recipients have been as follows:

1919 HERBERT C. HOOVER, for his preeminent services in behalf of the public welfare

1922 ROBERT W. HUNT, for his pioneer work in the development of the steel industry, and for a life devoted to the advancement of the engineering profession

1923 ARTHUR N. TALBOT, for his life work as a student and teacher, investigator and writer, and for his enduring contribution to the science of engineering

1925 JONAS WALDO SMITH, for preeminent services in promoting the public welfare and for the rare combination of vision, technical skill, and administrative ability and courageous leadership in engineering

1926 JOHN WATSON ALVORD, for his pioneer work in developing the fundamental principles of public utility valuation and his marked contributions to sanitary science

1927 ORVILLE WRIGHT, for fundamental scientific research and the resultant successful airplane flight

1928 MICHAEL I. PUPIN, for devotion to scientific research leading to his inventions which have materially aided the development of long-distance telephony and radio broadcasting

CODE OF ETHICS

In 1912, the Society appointed its first Committee on Ethics. This committee produced a code which was adopted by letter-ballot of the Society in 1914. It will be found under Article B15 of the By-Laws, elsewhere in this volume.

Professional Conduct Committee

To administer the code, the Council appointed a Standing Committee on Professional Conduct, the personnel of which appears on page 60.

The full procedure for handling cases is given in the Rules of the Society (R15, Rules 1 and 2), found elsewhere in this volume.

EXCHANGE OF COURTESIES

A Card of Introduction is issued annually to members of the A.S.M.E. in good standing. Besides serving as a means of general introduction, this also gives entrée to a number of engineering societies and clubs in this country and abroad, with whom an exchange of privileges has been arranged. In the case of an engineering club *these privileges do not include club facilities, sleeping rooms, or restaurant.* In no instance do they entitle members to borrow books from libraries, and they are not intended to give residents of cities the privileges of the local engineering organizations. The spirit of the exchange is rather in the nature of special courtesies extended to engineers visiting from other communities, such as the receipt of mail, privileges of the writing and reading rooms, and general information regarding local engineers and industrial plants.

The societies with which the A.S.M.E. has exchange privileges are:

Baltimore, Md., Engineers' Club
Boston, Mass., Society of Civil Engineers
Chicago, Ill., Western Society of Engineers
Cleveland, Ohio, Cleveland Engineering Society
Copenhagen, Danish Society of Civil Engineers
Dayton, Ohio, Engineers' Club of Dayton
Detroit, Mich., Detroit Engineering Society
Havana, Cuba, Cuban Society of Engineers
Gainesville, Fla., Florida Engineering Society
Kansas City, Mo., Engineers' Club of Kansas City
London, Eng., Institution of Civil Engineers
London, Eng., Institution of Mechanical Engineers
London, Eng., Iron & Steel Institute
London, Eng., Junior Institution of Engineers
Los Angeles, Calif., Engineering and Architects Association
Montreal, Que., Can., Engineering Institute of Canada
Nashville, Tenn., Engineering Association of Nashville
New Orleans, La., Louisiana Engineering Society
New York, American Gas Institute
New York, American Institute of Electrical Engineers
New York, American Institute of Mining & Metallurgical Engineers
New York, American Society of Civil Engineers

New York, American Society of Refrigerating Engineers
New York, American Society of Safety Engineers
New York, Chemists Club Library
New York, Columbia University Library
New York, New York Railroad Club
Oslo, Norway, Den Norske Ingeniorforening
Philadelphia, Pa., Engineers' Club of Philadelphia
Pittsburgh, Pa., Engineers' Society of Western Pennsylvania
Prague, Czechoslovakia, Society of Engineers and Architects
Providence, R. I., Providence Engineering Society
Rochester, N. Y., Rochester Engineering Society
St. Louis, Mo., Engineers' Club of St. Louis
Scranton, Pa., Engineers' Society of N. E. Pennsylvania
Scranton, Pa., Scranton Engineers' Club
Seattle, Wash., Pacific Northwest Society of Engineers
Spokane, Wash., Associated Engineers of Spokane
Syracuse, N. Y., Technology Club of Syracuse
Utica, N. Y., Mohawk Valley Engineers' Club
Washington, D. C., Society of American Military Engineers

THE WOMAN'S AUXILIARY TO THE A. S. M. E.

The Woman's Auxiliary to the A.S.M.E. was originally organized to further promote the pleasant relationships developed at Annual Meetings.

It has developed, however, into an organization with many varied activities, thus attracting the membership and interest of all.

An Education Fund has been created from which loans have been made to engineering students.

Another activity has been the collection and distribution of technical literature to engineering colleges and societies.

Regular meetings are held on the second Thursday of each month from October to May, inclusive, in the Engineering Societies Building. Dues are $2.00 per year and the initiation fee is $1.00.

All women in the families of members of the A.S.M.E. are most cordially invited to join the Auxiliary and participate in its functions.

GENERAL INFORMATION—PART 2

OFFICERS AND COUNCIL

President

Alex Dow

Past-Presidents

John Lyle Harrington
Fred R. Low
W. F. Durand
W. L. Abbott
Charles M. Schwab

Vice-Presidents

Terms expire December, 1928	*Terms expire December, 1929*
Charles L. Newcomb	John H. Lawrence
E. O. Eastwood	E. A. Muller
Edwards R. Fish	Newell Sanders
	Paul Wright

Managers

Terms expire December, 1928	*Terms expire December, 1929*
Robert L. Daugherty	Paul Doty
William Elmer	Ralph E. Flanders
Charles E. Gorton	Conrad N. Lauer

Terms expire December, 1930

Frederick H. Dorner
William A. Hanley
L. B. McMillan

Treasurer

Erik Oberg

Secretary

Calvin W. Rice

Assistant Secretaries

C. E. Davies
E. Hartford
C. B. LePage

Executive Committee of Council

Alex Dow, *Chairman*
Edwards R. Fish, *Vice-Chairman*
Fred R. Low
Charles M. Schwab
John H. Lawrence
Conrad N. Lauer
L. B. McMillan
Calvin W. Rice, *Secretary*

Chairmen of Standing Committees

Representatives on Council but without vote

Finance, H. V. Coes
E. H. West, *Vice-Chairman*
Meetings and Program,
R. M. Gates
Publications, K. H. Condit
Membership, Hosea Webster
Professional Divisions,
R. T. Kent
Local Sections, J. D. Cunningham
Constitution and By-Laws
E. E. Howard
W. D. Ennis, *Vice-Chairman*
Awards, Ira N. Hollis
L. P. Alford, *Vice-Chairman*
Relations with Colleges,
E. F. Church, Jr.
Education and Training for Industries, J. T. Faig
Library, Percy H. Thomas
Standardization, Collins P. Bliss
Research, R. J. S. Pigott
Power Test Codes, Fred R. Low
Safety, John Price Jackson
Professional Conduct,
Charles R. Main

STANDING COMMITTEES

NOTE.—*Dates in parentheses denote expiration of terms.*

Finance

H. V. Coes, *Chairman and Representative on Council* (1929)
E. H. West, *Vice-Chairman* (1928)
F. A. Schaff (1930)
James L. Walsh (1931)
David Lofts (1932)
Council Representatives: Edwards R. Fish (1928)
John H. Lawrence (1929)

Meetings and Program

R. M. Gates, *Chairman and Representative on Council* (1928)
S. W. Dudley (1929)
W. L. Batt (1930)
G. M. Eaton (1931)
F. M. Feiker (1932)

Publications

K. H. Condit, *Chairman and Representative on Council* (1928)
E. D. Dreyfus (1929)
W. A. Shoudy (1930)
F. V. Larkin (1931)
W. H. Winterrowd (1932)

(*Personnel of Biography Advisory Committee, p.* 62)

Membership

Hosea Webster, *Chairman and Representative on Council* (1928)
S. D. Collett (1929)
L. M. Comstock (1930)
F. A. Waldron (1931)
H. W. Butler (1932)

Professional Divisions

R. T. Kent, *Chairman and Representative on Council* (1928)
Archibald Black (1929)
J. W. Roe (1930)
H. W. Brooks (1931)
W. F. Dixon (1932)

(*Chairman of Professional Divisions' Executive Committees, p.* 62)

Local Sections

James D. Cunningham, *Chairman and Representative on Council* (1928)
Paul Doty (1929) Harry R. Westcott (1931)
Frank H. Crockard (1930) Charles W. Bennett (1932)

(*Chairman of Local Sections' Executive Committees, pp.* 63-64)

Constitution and By-Laws

E. E. Howard, *Chairman and Representative on Council* (1928)
W. D. Ennis (1929) A. D. Blake (1931)
Geo. E. Pfisterer (1930) Thos C. McBride (1932)

Awards

Ira N. Hollis, *Chairman and Representative on Council* (1930)
L. P. Alford, *Vice-Chairman* (1928) H. L. Seward (1931)
A. M. Greene, Jr. (1929) Roy V. Wright (1932)

Relations with Colleges

E. F. Church, Jr., *Chairman and Representative on Council* (1928)
A. A. Potter (1929) M. C. Maxwell (1931)
S. H. Libby (1930) D. B. Prentice (1932)

(*Honorary Chairmen of Student Branches, pp.* 64-66)

Education and Training for the Industries

John T. Faig, *Chairman and Representative on Council* (1932)
R. L. Sackett (1928) W. S. Conant (1930)
S. S. Edmands (1929) D. C. Jackson (1931)

Library

Percy H. Thomas, *Chairman and Representative on Council* (1928)
O. E. Hovey (1929) Alten S. Miller (1931)
H. A. Lardner (1930) The Secretary, Calvin W. Rice

Research

R. J. S. Pigott, *Chairman and Representative of Council* (1928)
A. E. White (1929) W. Reuben Webster (1931)
Robt. L. Streeter (1930) W. H. Fulweiler (1932)

(*Complete list of Research Committees, pp.* 66-67)

Standardization

C. P. Bliss, *Chairman and Representative on Council* (1929)
A. M. Houser (1928) H. B. Taylor (1931)
E. J. Kearney (1930) L. K. Sillcox (1932)

(*Complete list of Standardization Committees, pp.* 67-71)

Power Test Codes

Fred R. Low, *Chairman and Representative on Council* (1930)

Terms expire November 30, 1928

N. A. Carle
G. A. Goodenough
L. S. Marks
E. N. Trump
A. C. Wood

Terms expire November 30, 1929

C. H. Berry
L. Hodgkinson
D. S. Jacobus
L. F. Moody
E. B. Ricketts

Terms expire November 30, 1930

F. R. Low
L. P. Breckenridge
R. H. Fernald
C. F. Hirshfeld
R. J. S. Pigott

Terms expire November 30, 1931

A. G. Christie
P. Diserens
C. E. Lucke
G. A. Orrok
W. M. White

Terms empire November 30, 1932

H. Cooke
E. R. Fish
O. P. Hood
H. B. Oatley
W. J. Wohlenberg

(*Complete list of Power Test Code Committees, pp.* 71-72)

Safety

J. P. Jackson, *Chairman and Representative on Council* (1930)
H. L. Whittemore (1928)
G. E. Sanford (1929)
L. R. Palmer (1931)
A. M. Tode (1932)

(*Complete list of Safety Committees, pp.* 72-73)

Professional Conduct

Chas. R. Main, *Chairman and Representative on Council* (1928)
I. E. Moultrop (1929)
Jas. E. Sague (1930)
Dwight P. Robinson (1931)
William B. Powell (1932)

SPECIAL COMMITTEES

Boiler Code

Fred R. Low, *Chairman*
John A. Stevens, *Honorary Chairman*
D. S. Jacobus, *Vice-Chairman*
C. W. Obert, *Honorary Secretary*
M. Jurist, *Acting Secretary*
H. E. Aldrich
Wm. H. Boehm
Frank S. Clark
Francis W. Dean
W. F. Durand
Thomas E. Durban
Edwards R. Fish
Vincent M. Frost
Charles E. Gorton
Arthur M. Greene, Jr.
Frank B. Howell
Chas. L. Huston
S. F. Jeter
J. O. Leech
Edward F. Miller
M. F. Moore
I. E. Moultrop
C. O. Myers
James Partington
C. L. Warwick
H. LeRoy Whitney

(*Complete list of Boiler Code Committees, p.* 73)

Regular Nominating Committee

GROUP	REPRESENTATIVE	ALTERNATE
I	F. H. Daniels Worcester	C. R. Main Boston
II	James Partington, *Chairman* New York	H. H. Barnes, Jr. New York
III	Charles Schenck Bethlehem	D. B. Prentice Easton
IV	H. L. Freeman, *Secretary* Birmingham	Robert Gregg Atlanta
V	J. T. Faig Cincinnati	J. R. Brown Cleveland
VI	W. P. Hunt Moline	D. E. Foster Tulsa
VII	H. L. Doolittle Los Angeles	W. A. S. Harmon Los Angeles

Local Sections in Nominating Committee Groups

GROUP I

Boston
Bridgeport
Green Mountain
Hartford
Meriden
New Britain
New Haven
Providence
Waterbury
Western Mass.
Worcester

GROUP II

Metropolitan (N. Y.) and Foreign Members

GROUP III

Baltimore
Buffalo
Central Pa.
Lehigh Valley
Ontario
Philadelphia
Plainfield
Rochester
Schenectady
Susquehanna
Syracuse
Utica
Washington, D.C.

GROUP IV

Atlanta
Birmingham
Charlotte
Chattanooga
Florida
Greenville
Houston
Knoxville
Memphis
New Orleans
North Texas
Raleigh
Savannah
Virginia

GROUP V

Akron
Cincinnati
Cleveland
Columbus
Dayton
Detroit
Erie
Indianapolis
Louisville
Peninsula
Pittsburgh
Toledo
West Virginia

GROUP VI

Chicago
Kansas City
Mid-Continent
Milwaukee
Minneapolis
Nebraska
Rock River Valley
St. Louis
St. Paul
Tri-Cities

GROUP VII

Colorado
Inland Empire
Los Angeles
Oregon
San Francisco
Utah
Western Washington

Tellers of Election

George E. Hagemann
Hans J. Meyer
Leon H. A. Weaver

Biography Advisory Committee

W. F. M. Goss, *Chairman*
Fred R. Low
Roy V. Wright
Geo. A. Orrok
John R. Freeman

Economic Status of the Engineer

Conrad N. Lauer, *Chairman*
C. F. Hirschfeld
Dexter S. Kimball
H. B. Oatley
W. A. Starrett
H. L. Whittemore

Society's Revenues

W. L. Batt, *Chairman*
Dexter S. Kimball
R. E. Flanders
Conrad Lauer
Erik Oberg
J. D. Cunningham
J. L. Walsh

Meetings and Budget, Conference Committee

H. V. Coes, *Chairman*, Finance Committee

With Representatives of Meetings and Program, Local Sections, and Professional Divisions Committees

PROFESSIONAL DIVISIONS

(*For complete personnel of executive and sub-committees consult 1928 Membership List*)

Division	Executive Committee Chairmen
Aeronautic	Edwin E. Aldrin
Applied Mechanics	G. M. Eaton
Fuels	Victor J. Azbe
Hydraulic	Ely C. Hutchinson
Iron and Steel	G. T. Snyder
Machine-Shop Practice	L. C. Morrow
Management	W. L. Conrad
Materials Handling	R. H. McLain
National Defense	James L. Walsh
Oil and Gas Power	E. J. Kates
Petroleum	Walter Samans
Power	V. E. Alden
Printing Industries	Edward Pierce Hulse
Railroad	Wm. Elmer
Textile	James W. Cox, Jr.
Wood Industries	Wm. Braid White

LOCAL SECTIONS

(For complete personnel and further information consult 1928 Membership List)

Section	Executive Committee Chairmen
Akron	Hal Jennings
Anthracite-Lehigh Valley	D. B. Prentice
Atlanta	E. F. McLaughlin
Baltimore	F. A. Allner
Birmingham	G. L. Bentley
Boston	P. C. Idell
Bridgeport	H. E. Sparfeld
Buffalo	G. L. Williams
Central Pennsylvania	A. G. Cole
Charlotte	E. E. Williams
Chattanooga	Newell Sanders
Chicago	Thomas Wilson
Cincinnati	C. H. Fox
Cleveland	R. C. Brett
Colorado	B. E. Sibley
Columbus	H. M. Bush
Dayton	E. S. Patch
Detroit	F. H. Low
Erie	McDonald S. Reed
Florida	H. F. Greene
Green Mountain	H. A. Lincoln
Greenville	C. E. Waddell
Hartford	E. D. P. Gross
Houston	Wm. F. Eblen
Indianapolis	F. C. Wagner
Inland Empire	H. J. MacCamy
Kansas City	R. S. Neal
Knoxville	J. A. Switzer
Los Angeles	W. A. S. Harmon
Louisville	B. M. Brigman
Memphis	T. H. Allen
Meriden	R. L. Morrow
Metropolitan	J. O. G. Gibbons
Mid-Continent	C. R. Barton
Milwaukee	F. H. Dorner
Minneapolis	J. A. Colvin
Nebraska	A. A. Luebs
New Britain	H. C. Barnes
New Haven	Gustave Welter
New Orleans	J. M. Todd
North Texas	S. E. Gillespie
Ontario	E. A. Allcut
Oregon	S. H. Graf
Peninsula	R. K. Merrill
Philadelphia	J. G. Hatman
Pittsburgh	R. W. Andrews
Plainfield	C. A. Dawley
Providence	H. B. Lewis
Raleigh	J. M. Foster

Section	Executive Committee Chairmen
Rochester	R. C. Hands
Rock River Valley	Herman Hugle
St. Louis	V. J. Azbe
St. Paul	J. J. Summersby
San Francisco	Dennistoun Wood
Savannah	D. H. Levan
Schenectady	G. B. Warren
Susquehanna	Gordon Campbell
Syracuse	W. H. G. Murray
Toledo	H. O. Hem
Tri-Cities	G. F. Jenks
Utah	N. L. Stewart
Utica	B. E. White
Virginia	J. S. A. Johnson
Washington, D. C.	E. C. Magdeburger
Waterbury	M. L. Martus
West Virginia	J. B. Grumbein
Western Massachusetts	R. A. Packard
Western Washington	M. E. Arkills
Worcester	C. O. Streeter
Youngstown	R. J. Wean

STUDENT BRANCHES

(*For further information consult 1928 Membership List*)

Name and Location	Honorary Chairmen
Akron, Municipal Univ. of, Akron, Ohio	R. R. Jones
Alabama Polytechnic Inst., Auburn, Ala	C. R. Hixon
Arkansas, Univ. of, Fayetteville, Ark	E. L. Thearle
Armour Inst. of Technology, Chicago, Ill	J. C. Peebles
Brooklyn, Polytechnic Inst. of, Brooklyn, N. Y	F. D. Carvin
Brown Univ., Providence, R. I	W. H. Kenerson
Bucknell Univ., Lewisburg, Pa	B. J. Wilson
California Inst. of Technology, Pasadena, Calif	R. L. Daugherty
California, Univ. of, Berkeley, Calif	H. B. Langille
Carnegie Inst. of Technology, Pittsburgh, Pa	T. G. Estep
Case School of Applied Science, Cleveland, Ohio	F. H. Vose
Catholic Univ., Washington, D. C	George A, Weschler
Cincinnati, Univ. of Cincinnati, Ohio	C. A. Joerger
Clemson College, Clemson College, S. C	E. L. Carpenter
Colorado Agricultural College, Fort Collins, Colo	L. D. Crain
Colorado, Univ. of, Boulder, Colo	S. L. Simmering
Columbia Univ., New York, N. Y	R. T. Livingston
Cooper Union, New York, N. Y	G. F. Bateman
Cornell Univ., Ithaca, N. Y	S. S. Garrett
Drexel Inst., Philadelphia, Pa	J. H. Billings
Florida, Univ. of, Gainesville, Fla	Melvin Price
George Washington Univ., Washington, D. C	A. P. Johnson
Georgia School of Technology, Atlanta, Ga	W. B. Dunkin
Idaho, Univ. of Moscow, Idaho	H. F. Gauss
Illinois, Univ. of., Urbana, Ill	A. C. Willard
Iowa State College, Ames, Ia	R. A. Norman

Name and Location	Honorary Chairmen
Iowa, State Univ. of, Iowa City, Ia	Merrit L. Fox
Johns Hopkins Univ., Baltimore, Md	A. G. Christie
Kansas State Agricultural College, Manhattan, Kan	J. P. Calderwood
Kansas, Univ. of, Lawrence, Kan	A. H. Sluss
Kentucky, Univ. of, Lexington, Ky	Carter C. Jett
Lafayette College, Easton, Pa	D. B. Prentice
Lehigh Univ., Bethlehem, Pa	Milton C. Stuart
Louisiana State Univ., Baton Rouge, La	L. J. LaSalle
Louisville, Univ. of, Louisville, Ky	D. C. Jackson, Jr.
Lowell Textile Sch., Lowell, Mass	John A. Stevens
Maine, Univ. of, Orono, Me	W. J. Sweetser
Marquette Univ., Milwaukee, Wis	John E. Schoen
Massachusetts Inst. of Technology, Cambridge, Mass	C. E. Fuller
Michigan State College, East Lansing, Mich	H. B. Dirks
Michigan, Univ. of, Ann Arbor, Mich	R. S. Hawley
Minnesota, Univ. of, Minneapolis, Minn	J. V. Martenis
Mississippi A. & M. College, A. & M. College, Miss	R. C. Carpenter
Missouri, Univ. of, Columbia, Mo	R. W. Selvidge
Montana State College, Bozeman, Mont	R. T. Challender
Nebraska, Univ. of, Lincoln, Neb	F. W. Haney
Nevada, Univ. of, Reno, Nev	C. H. Kent
Newark College of Engineering, Newark, N. J	J. Ansel Brooks
New Hampshire, Univ. of, Durham, N. H	E. L. Getchell
New York, College of City of, New York, N. Y	Arthur Buckner
New York Univ., New York, N. Y	G. A. Stetson
North Carolina State College, Raleigh, N. C	W. J. Dana
North Dakota, Univ. of, Grand Forks, N. D	N. T. Bourke
Northeastern Univ., Boston, Mass	R. Stearns
Ohio Northern Univ., Ada, Ohio	John A. Needy
Ohio State Univ., Columbus, Ohio	W. T. Magruder
Oklahoma A. & M. College, Stillwater, Okla	K. L. Rhodes
Oklahoma, Univ. of, Norman, Okla	S. B. Helmrich
Oregon State Agricultural College, Corvallis, Ore	Wm. H. Paul
Pennsylvania State College, State College, Pa	C. W. Beese
Pennsylvania, Univ. of, Philadelphia, Pa	G. E. Crofoot
Pittsburgh, Univ. of, Pittsburgh, Pa	W. F. Weiland
Porto Rico, Univ. of, Mayaguez, P. R	Miguel F. Gil
Pratt Inst., Brooklyn, N. Y	R. B. Dale
Princeton Univ., Princeton, N. J	A. M. Greene, Jr.
Purdue Univ., W. Lafayette, Ind	H. C. Hockema
Rensselaer Polytechnic Inst., Troy, N. Y	G. K. Palsgrove
Rice Inst., Houston, Tex	J. H. Pound
Rose Polytechnic Inst., Terre Haute, Ind	J. B. Peddle
Rutgers Univ., New Brunswick, N. J	F. E. Mehrhof
Santa Clara, Univ. of, Santa Clara, Calif	G. L. Sullivan
Stanford Univ., Stanford University, Calif	Guido H. Marx
Stevens Inst. of Technology, Hoboken, N. J	R. M. Anderson
Swarthmore College, Swarthmore, Pa	C. G. Thatcher
Syracuse Univ., Syracuse, N. Y	A. R. Acheson
Tennessee, Univ. of, Knoxville, Tenn	J. A. Switzer
Texas, A. & M. College of, College Station, Tex	Ray Flagg
Texas, Univ. of, Austin, Tex	Carl J. Eckhart
Tufts College, Tufts College, Mass	Edgar MacNaughton
U. S. Naval Academy, P. G. Sch., Annapolis, Md	P. J. Kiefer
Utah, Univ. of, Salt Lake City, Utah	E. H. Bechstrand

Name and Location	Honorary Chairmen
Vanderbilt Univ., Nashville, Tenn.	P. A. Cushman
Vermont, Univ. of, Burlington, Vt.	E. A. Robinson
Villanova College, Villanova, Pa.	J. S. Morehouse
Virginia Polytechnic Inst., Blacksburg, Va.	W. T. Ellis
Virginia, Univ. of, Charlottesville, Va.	W. M. Thornton
Washington Univ., St. Louis, Mo.	Ernest Ohle
Washington, State College of, Pullman, Wash.	A. C. Abell
Washington, Univ. of, Seattle, Wash.	George S. Wilson
West Virginia Univ., Morgantown, W. Va.	H. M. Cather
Wisconsin, Univ. of, Madison, Wis.	G. L. Larson
Worcester Polytechnic Inst., Worcester, Mass.	Francis Roys
Wyoming, Univ. of, Laramie, Wyo.	Earl D. Hay
Yale Univ., New Haven, Conn.	S. W. Dudley

PROFESSIONAL (TECHNICAL) COMMITTEES

(*Revised to December 31, 1928*)

Research

- A.S.M.E. Main Research Committee (Standing) (5)[*]
- Special Committee on Lubrication (10)
  - Sub-Committee on Finance (1)
- Special Committee on Fluid Meters (13)
  - Sub-Committee on Influence of Installation—Part 2 (5)
  - Sub-Committee on Description of Flow Meters and Water Meters (3)
  - Sub-Committee on Revision of Material on Pitot Tubes in Part 1 (2)
  - Sub-Committee on Pulsating Flow (3)
  - Sub-Committee on High Velocity Measurements (1)
  - Sub-Committee on Revision of Part 1—Report on Fluid Meters (6)
  - Sub-Committee on Revision of the Dimensional Analysis Section of Fluid Meter Report (3)
- Special Committee on Properties of Steam and the Extension of the Steam Table (3)
- Special Committee on Strength of Gear Teeth (10)
- Special Committee on Cutting of Metals (18)
  - Advisory Committee (10)
  - Sub-Committee on Cooperation with Industries and Publicity (4)
  - Sub-Committee on Standards (4)
  - Sub-Committee on Research in Cutting Tools (4)
  - Sub-Committee on Properties of Materials (3)
  - Sub-Committee on Bibliography and Correlation (1)
  - Sub-Committee on Cutting Fluids (6)
    - Sub-Group on Finance (4)
  - Sub-Committee on Turning Processes (3)
  - Sub-Committee on Machinability of Metals (1)
- Special Committee on Mechanical Springs (19)
  - Sub-Committee on Present Status of the Art (7)
  - Sub-Committee on Program (10)
  - Sub-Committee on Spring Materials (1)
  - Sub-Committee on Bibliography (1)

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[*] Note.—The figure in parentheses indicates the number of men on each committee.

Joint Committee on Effect of Temperature on the Properties of Metals (12)
Special Committee on Condenser Tubes (20)
  Executive Committee (6)
  Sub-Committee on Questionnaire (3)
  Sub-Committee on Finance (1)
  Sub-Committee on Bibliography (2)
Joint Committee on Boiler Feedwater Studies (61)
  Executive Committee (21)
  Finance Committee (7)
  Sub-Committee on Sedimentation with and without Chemicals, Pressure and Gravity Filters and Deconcentrators, Continuous Blow-Down Apparatus (5)
  Sub-Committee on Water Softened by Chemicals (External Treatment) (9)
  Sub-Committee on Zeolite Softeners, Internal Treatment, Priming and Foaming, Electrolytic Scale Prevention (13)
  Sub-Committee on Surface Condensers, Evaporators and Deaerators (8)
  Sub-Committee on Corrosion of Boilers and the Effect of Treated Water in Accelerating or Relieving These Troubles (16)
  Sub-Committee on Embrittlement of Metals (12)
  Sub-Committee on Municipal Water Supply in Relation to Boiler Use (12)
  Sub-Committee on Standardization of Water Analysis (12)
  Sub-Committee on Bibliography (8)
Special Committee on Boiler Furnace Refractories (19)
Special Committee on Elevators (11)
Special Committee on Worm Gears (8)
Joint Committee on Welding of Pressure Vessels (51)
  Executive Committee (8)
  Sub-Committee on Methods of Test (12)
  Sub-Committee on Procedure of Specifications (13)
Special Committee on Saws and Knives (10)
Special Committee on Existing Supplies of Hardwood (9)
Special Committee on Cutting Edges (Thin Metal Plates) ( )
Special Committee on Strength of Cylindrical Vessels under Pressure ( )
Special Committee on Absorption of Radiant Heat in Boiler Furnaces (7)
Special Committee on Fuels (13)
Special Committee on Velocity Measurement of Fluid Flow (3)
Special Committee on Management Formula (6)
Joint Committee on Physicial Constants of Refrigerants ( )
Special Committee on Diesel Fuel Oil Specifications (19)
  Sub-Committee on Questionnaire to Manufacturers (3)
  Sub-Committee on Questionnaire to Users (3)
  Sub-Committee on Questionnaire to Oil Refiners (3)
Special Committee on Airplane Vibration with Special Reference to Instruments (14)
Representatives on Other Research Committees (16)

Standardization

A.S.M.E. Standardization Committee (Standing) (5)
Sectional Committee on Shafting (16)
  Sub-Committee on Shafting Dimensions (4)
  Sub-Committee on Stock Key Sizes (4)

- Sub-Committee on Code for Design of Transmission Shafting (7)
- Sub-Committee on Taper Keys (3)
- Sub-Committee on Woodruff Keys and Keyseats (15)

Sectional Committee on Plain Limit Gages for General Engineering Work (20)
  - Sub-Committee on Tolerances, Allowances and Gages for Metal Fits (3)
  - Sub-Committee on Methods of Gaging and Specifications for Plain Limit Gages (4)
  - Sub-Committee on Gages, Their Limits, Manufacture and Use (5)
  - Sub-Committee on Editing (4)

Sectional Committee on Ball Bearings (14)

Sectional Committee on Elevators (21)

Sectional Committee on Gears (32)
  - Executive Committee (3)
  - Sub-Committee No. 1 on Program (3)
  - Sub-Committee No. 2 on Editing Reports (3)
  - Sub-Committee No. 3 on Nomenclature (6)
  - Sub-Committee No. 4 on Tooth Form (Spur Gear) (6)
  - Sub-Committee No. 5 on Helical Gears (7)
  - Sub-Committee No. 6 on Worm Gears (6)
  - Sub-Committee No. 7 on Bevel Gears (5)
  - Sub-Committee No. 8 on Materials (6)
  - Sub-Committee No. 9 on Inspection (4)
  - Sub-Committee No. 10 on Horse Power Rating (5)

Sectional Committee on Standardization and Unification of Screw Threads (18)
  - Sub-Committee on Gages and Gaging (4)
  - Working Committee (7)

Sectional Committee on Pipe Flanges and Fittings (57)
  - Sub-Committee No. 1 on Cast Iron Flanges and Flanged Fittings (36)
    - Sub-Group on Cast Iron Flanges for Pressures under 100 lb. (8)
    - Sub-Group on Ammonia Fittings (7)
  - Sub-Committee No. 2 on Screwed Fittings (26)
    - Working Committee (5)
  - Sub-Committee No. 3 on Steel Flanges and Flanged Fittings (23)
    - Working Committee (11)
    - Sub-Group on 1350 lb. Steel Flanges and Flanged Fittings (5)
    - Sub-Group on Bolting of Flanges (6)
    - Sub-Group on Steel Companion Flanges (8)
  - Sub-Committee No. 4 on Materials and Stresses (8)
  - Sub-Committee No. 5 on Face to Face Dimensions of Ferrous Flanged Valves (13)
  - Sub-Committee No. 6 on Malleable Iron or Steel Brass Seat Unions (24)
  - Sub-Committee No. 7 on Rating of Pipe Fittings (9)
  - Sub-Committee No. 8 on Marking of Pipe Fittings (7)

Sectional Committee on Bolt, Nut and Rivet Proportions (53)
  - Sub-Committee No. 1 on Large and Small Rivets (10)
  - Sub-Committee No. 2 on Wrench Head Bolts and Nuts (17)
    - Sub-Group on Definitions ( )
    - Sub-Group on Bolt Diameters ( )
    - Sub-Group on Stud Bolts ( )
    - Sub-Group on Wrench Openings ( )
  - Sub-Committee No. 3 on Slotted Head Proportions (10)
  - Sub-Committee No. 4 on Track Bolts and Nuts (10)

- Sub-Committee No. 5 on Round Unslotted Head Bolts (Carriage Bolts) (7)
- Sub-Committee No. 6 on Plow Bolts (5)
- Sub-Committee No. 7 on Body Dimensions and Material (11)
- Sub-Committee No. 8 on Nomenclature (10)
- Sub-Committee No. 9 on Socket Head Cap Screws ( )

Sectional Committee on Scheme for Identification of Piping Systems (33)
- Sub-Committee on Identification by Colors (6)
- Sub-Committee on Classification (4)
- Sub-Committee on Identification Markings Other than Color (3)
- Sub-Committee on Editing (8)
- Executive Committee (5)

Sectional Committee on Small Tools and Machine Tool Elements (18)
- Executive Committee (5)
- Technical Committee No. 1 on T-Slots (14)
- Technical Committee No. 2 on Tool Holder Shanks and Tool Post Openings (15)
  - Manufacturers Sub-Group on Lathe and Planer Tools (3)
- Technical Committee No. 3 on Machine Tapers (18)
  - Sub-Group on Taper Series (8)
  - Sub-Group on Standard Dimensions (3)
- Technical Committee No. 4 on Spindle Noses and Collets for Machine Tools (23)
- Technical Committee No. 5 on Milling Cutters (23)
  - Sub-Group on Profile Cutters (4)
  - Sub-Group on Keyways (4)
  - Sub-Group on Nomenclature (4)
  - Sub-Group on Limits (4)
  - Sub-Group on Formed Cutters (4)
  - Sub-Group on Hobs (4)
  - Sub-Group on Inserted Tooth Cutters (4)
- Technical Committee No. 6 on Designations and Working Ranges of Machine Tools (24)
- Technical Committee No. 7 on Simplification and Standardization of Drill Sizes (8)
- Technical Committee No. 8 on Drill Bushings (9)
- Technical Committee No. 9 on Punch and Die Holders (8)
- Technical Committee No. 10 on Circular Forming Tools and Holders
- Technical Committee No. 11 on Chucks and Chuck Jaws (9)
  - Sub-Group on Master Chuck Jaws (5)
  - Sub-Group on Adapters for Air Cylinders (4)
- Technical Committee No. 12 on Cut and Ground Taps (8)

Sectional Committee on Scientific and Engineering Symbols and Abbreviations (35)
- Executive Committee (7)
- Sub-Committee No. 1 on Symbols for Mechanics, Structural Engineering and Testing Materials (4)
- Sub-Committee No. 2 on Symbols for Hydraulics (13)
  - Sub-Group on Theoretical Hydraulics (3)
  - Sub-Group on Hydrology (2)
  - Sub-Group on Water Power (2)
  - Sub-Group on Pumps and Pumping Machinery (2)
  - Sub-Group on Sanitary Engineering and Water Piping (2)
  - Sub-Group on Irrigation (1)
  - Sub-Group on Turbines (2)

  - Sub-Committee No. 3 on Symbols for Heat and Thermodynamics (28)
  - Sub-Committee No. 4 on Photometry and Illumination (1)
  - Sub-Committee No. 5 on Aeronautical Symbols (11)
  - Sub-Committee No. 6 on Mathematical Symbols (14)
  - Sub-Committee No. 7 on Electrotechnical Symbols including Radio (16)
    - Sub-Group on Letter Symbols (4)
    - Sub-Group on Electric Power including Interior Wiring (7)
    - Sub-Group on Radio (4)
    - Sub-Group on Supply Material ( )
    - Sub-Group on Traction including Railway Signaling (4)
    - Sub-Group on Telephone and Telegraph (5)
  - Sub-Committee No. 8 on Navigational and Topographical Symbols (3)
  - Sub-Committee No. 9 on Abbreviations for Engineering and Scientific Terms (5)
- Sectional Committee on Plain and Lock Washers (25)
  - Sub-Committe No. 1 on Plain Washers (9)
  - Sub-Committee No. 2 on Lock Washers (17)
- Sectional Committee on Machine Pins (13)
  - Sub-Committee No. 1 on Straight Taper and Dowel Pins ( )
  - Sub-Committee No. 2 on Split Pins ( )
- Sectional Committee on Code for Pressure Piping (69)
  - Sub-Committee No. 1 on Plan and Scope (6)
  - Sub-Committee No. 2 on Power Piping (22)
  - Sub-Committee No. 3 on Hydraulic Piping (11)
    - Sub-Group on Penstock Work (1)
    - Sub-Group on Hydraulic High Pressure Piping ( )
    - Sub-Group on Water Works Piping (1)
  - Sub-Committee No. 4 on Gas and Air Piping (17)
  - Sub-Committee No. 5 on Refrigerating Piping (9)
  - Sub-Committee No. 6 on Oil Piping (8)
  - Sub-Committee No. 7 on Piping Materials (13)
  - Sub-Committee No. 8 on Fabrication Details (18)
    - Sub-Group on Hangers ( )
    - Sub-Group on Joints other than Welded (1)
    - Sub-Group on Pipe Bends (1)
    - Sub-Group on Power Piping (1)
    - Sub-Group on Welding (2)
- Sectional Committee on Standards for Drawings and Drafting Room Practice (55)
  - Sub-Committee No. 1 on Specifications for Paper and Cloth (14)
    - Sub-Group on Materials Specification (3)
  - Sub-Committee No. 2 on Method of Indicating Dimensions (12)
  - Sub-Committee No. 3 on Lettering (9)
    - Sub-Group on Questionnaire (2)
  - Sub-Committee No. 4 on Layout (11)
  - Sub-Committee No. 5 on Line Work (10)
  - Sub-Committee No. 6 on Graphical Symbols (8)
- Sectional Committee on Standards for Graphic Presentation (40)
  - Sub-Committee No. 1 on Plan and Scope (9)
  - Sub-Committee No. 2 on Terminology (7)
  - Sub-Committee No. 3 on Time Series Charts (7)
  - Sub-Committee No. 4 on Non-Time Series Charts (8)
  - Sub-Committee No. 5 on Survey of Current Practice (8)
  - Sub-Committee No. 6 on Engineering and Scientific Graphs (9)

Sectional Committee on Transmission Chains and Sprockets (18)
  Sub-Committee on Roller Chain Standardization (7)
  Sub-Committee on Silent Chain Standardization (8)
Sectional Committee on Wire and Sheet Metal Gaging Systems (28)
Sectional Committee on Electric Motor Frame Dimensions (24)
  Working Committee (7)
Sectional Committee on Pipe Threads (39)
  Sub-Committee No. 1 on Editing and Gaging (14)
  Sub-Committee No. 2 on Taper Pipe Threads (9)
  Sub-Committee No. 3 on Straight Pipe Threads (11)
    Working Committee (2)
  Sub-Committee No. 4 on Plumbers' Threads, etc. (7)
  Sub-Committee No. 5 on Screw Threads for Rigid Electrical Conduit (6)
  Sub-Committee No. 6 on Special Threads for Thin Tubes (8)
Sectional Committee on Wrought Iron and Wrought Steel Pipe and Tubing (39)
  Sub-Committee No. 1 on Plan, Scope and Editing (5)
  Sub-Committee No. 2 on Pipe and Tubing for Low Temperature Service (15)
  Sub-Committee No. 3 on Pipe and Tubing for High Temperature Service (16)
  Sub-Committee No. 4 on Materials (15)
Sectional Committee on Speeds of Driven Machines (30)
  Sub-Committee No. 1 on Plan and Scope (7)
Sectional Committee on Screw Threads for Fire Hose Couplings ( )
Sectional Committee on Screw Threads for Small Hose Couplings (26)
  Sub-Committee No. 1 on Hose Couplings for Fire Protective Purposes (7)
  Sub-Committee No. 2 on Hose Couplings for General Use (6)
Sectional Committee on Plumbing Equipment (24)
  Sub-Committee No. 1 on Plumbing Code (4)
  Sub-Committee No. 2 on Staple Vitreous China Plumbing Fixtures (12)
  Sub-Committee No. 3 on Staple Porcelain (All Clay) Plumbing Fixtures (10)
  Sub-Committee No. 4 on Enameled Sanitary Ware ( )
  Sub-Committee No. 5 on Lavatory and Sink Traps ( )
    Sub-Group on Brass Lavatories and Sink Traps (8)
  Sub-Committee No. 6 on Standards for Brass Plumbing Products (11)
Representatives on Other Standards Committees (24)
Representation on American Standards Association (3)

Power Test Codes

Main Committee on Power Test Codes (Standing) (25)
Individual Committee No. 1 on General Instructions (4)
Individual Committee No. 2 on Definitions and Values (5)
Individual Committee No. 3 on Fuels (14)
Individual Committee No. 4 on Stationary Steam Boilers (6)
Individual Committee No. 5 on Reciprocating Steam Engines (6)
Individual Committee No. 6 on Steam Turbines (9)

Individual Committee No. 7 on Reciprocating Steam-Driven Displacement Pumps (9)
Individual Committee No. 8 on Centrifugal and Rotary Pumps (7)
Individual Committee No. 9 on Displacement Compressors and Blowers (7)
Individual Committee No. 10 on Centrifugal and Turbo-Compressors and Blowers ( )
Individual Committee No. 11 on Complete Steam Power Plants (8)
Individual Committee No. 12 on Condenser, Water Heating and Cooling Equipment (7)
Individual Committee No. 13 on Refrigerating Systems (8)
Individual Committee No. 14 on Evaporating Apparatus (5)
Individual Committee No. 15 on Steam Locomotives (7)
Individual Committee No. 16 on Gas Producers (5)
Individual Committee No. 17 on Internal-Combustion Engines (6)
Individual Committee No. 18 on Hydraulic Power Plants (13)
Individual Committee No. 19 on Instruments and Apparatus (17)
Individual Committee No. 20 on Speed-Responsive Governors (4)
Representatives on U. S. National Committee of the International Electrotechnical Commission (5)

Safety Codes

A.S.M.E. Safety Committee (Standing) (5)
Sectional Committee on Safety Code for Mechanical Power Transmission Apparatus (27)
    Sub-Committee for Detail Classification of Belts (3)
    Sub-Committee for Modification of Rule 223 for Cone Pulley Belts (1)
    Sub-Committee on Mechanical Power Control (12)
Sectional Committee on Safety Code for Elevators (38)
    Sub-Committee on Research, Interpretations and Recommendations (10)
        Sub-Group on Program (5)
        Sub-Group on Arrangements (3)
    Sub-Committee on Operating and Inspecting Rules (10)
    Sub-Committee on Comparison of Existing Rules (4)
    Sub-Committee on Technical Information (5)
        Executive Committee (6)
        Working Sub-Committee (5)
Sectional Committee on Safety Code for Conveyors and Conveying Machinery (45)
    Sub-Committee No. 1 on Belt Conveyors, All Types, Steel Included, Apron Conveyors (7)
    Sub-Committee No. 2 on Chain and Belt Elevators and Conveyors (10)
    Sub-Committee No. 3 on Gravity Conveyors and Chutes, Live Roll Conveyors (8)
    Sub-Committee No. 4 on Spiral and Drag or Scraper Conveyors and Cable Flight Conveyors (9)
    Sub-Committee No. 5 on Cable Conveyors (5)
    Sub-Committee No. 6 on Air, Steam or Liquid Conveyors (6)
Sectional Committee on Safety Code for Machinery for Compressing Air (28)

- Sectional Committee on Safety Code for Cranes, Derricks and Hoists (61)
  - Executive Committee (6)
  - Sub-Committee No. 1 on Overhead and Gantry Cranes (22)
  - Sub-Committee No. 2 on Locomotive and Tractor Cranes (17)
  - Sub-Committee No. 3 on Derricks and Hoists (16)
  - Sub-Committee No. 4 on Miscellaneous Equipment for Cranes and Hoists (21)
  - Sub-Committee No. 5 on Jacks (8)
- Representatives on Other Safety Code Committees (22)

Boiler Code

- Main Committee on Boiler Code (25)
  - Executive Committee (8)
  - Sub-Committee on Boilers of Locomotives (4)
  - Sub-Committee on Care of Steam Boilers in Service (14)
  - Sub-Committee on Heating Boilers (7)
  - Sub-Committee on Material Specifications (4)
    - Conferring Committee of the American Society for Testing Materials (3)
    - Conferring Committee of the Association of American Steel Manufacturers (3)
  - Sub-Committee on Miniature Boilers (7)
  - Sub-Committee on Rules for Inspection (8)
  - Sub-Committee on Unfired Pressure Vessels (5)
  - Sub-Committee on Welding (12)
    - Conferring Committee of the American Welding Society (8)
- Conference Committee (35)

Résumé

Total number of Committees	320
Total number of A.S.M.E. Members on Committees	680
Total number of Non-Members on Committees	784
Total number of Committee Members	1464

A.S.M.E. REPRESENTATIVES ON JOINT ACTIVITIES

American Association for the Advancement of Science

Section M, Engineering

Chas. Russ Richards John T. Faig

Alternates may be appointed each year according to geographical location of meetings

American Engineering Council

Terms expire January 1, 1929

Charles M. Schwab, *New York, N. Y.*
O. P. Hood, *Washington, D. C.*
Dean E. Foster, *Tulsa, Okla.*
W. P. Hunt, *Moline, Ill.*
Charles Penrose, *Philadelphia, Pa.*
E. N. Trump, *Syracuse, N. Y.*
T. L. Wilkinson, *Davenport, Iowa*
D. Robert Yarnall, *Philadelphia, Pa.*
Walter S. Finlay, Jr., *Pittsburgh, Pa.*
Ira W. Dye, *Seattle, Wash.*

Terms expire January 1, 1930

Alex Dow, *Chairman, Detroit, Mich.*
L. P. Alford, *Vice-Chairman, New York, N. Y.*
Harold V. Coes, *Chicago, Ill.*
Arthur M. Greene, Jr., *Princeton, N. J.*
John Lyle Harrington, *Kansas City, Mo.*
Dexter S. Kimball, *Ithaca, N. Y.*
William S. Lee, *Charlotte, N. C.*
R. C. Marshall, Jr., *Washington, D. C.*

American Standards Association

C. P. Bliss (1928)[1]
S. G. Flagg, Jr. (1929)
Cloyd M. Chapman (1930)
K. H. Condit (alternate)
C. B. Le Page (alternate)

Engineering Foundation Board

H. Hobart Porter (1929)[2]
Geo. A. Orrok (1930)
D. Robert Yarnall (1931)

International Electro-Technical Commission

U. S. National Committee

Fred R. Low
W. F. Durand
C. H. Berry
H. Birchard Taylor
Francis Hodgkinson

John Fritz Medal Board of Award

Fred R. Low (1929)
D. S. Jacobus (1930)
Dexter S. Kimball (1931)
Charles M. Schwab (1932)

The terms of office expire in October of each year

Joseph A. Holmes Safety Association

Memorial Board

Brigadier-General Wm. H. Bixby[3]

Note.—*Dates in parentheses denote expiration of term*

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[1] Represents the A.S.M.E. on the Executive Committee of the A.S.A.
[2] A.S.M.E. representative from Board of Trustees of U.E.S.
[3] Deceased, September 29, 1928; O. P. Hood appointed successor.

National Research Council

Division of Engineering

Earle Buckingham (June, 1928) A. G. Christie (June, 1929)
B. H. Blood (June, 1930)

Society for the Promotion of Engineering Education

Board of Investigation and Coordination

John Lyle Harrington E. M. Herr
W. L. Durand (alternate)

United Engineering Society

H. Hobart Porter (1929) Roy V. Wright (1930)
Edwards R. Fish (1931)

Western Society of Engineers

Washington Award

H. V. Coes (June, 1928) Horace Carpenter (June, 1929)

General Assignments

By special invitation the Society has representatives on:

George Washington Bicentennial Commission, Gano Dunn.
National Committee on Metals Utilization, Department of Commerce, Stanley G. Flagg, Jr.
National Conference on Street and Highway Safety, Department of Commerce, E. J. Posselt.
Committee on Standardization Survey, Charles M. Schwab, H. Birchard Taylor (alternate).
National Research Council, Highway Research Committee, H. de B. Parsons
National Screw Thread Commission, Luther D. Burlingame.
International High Commission, Advisory Committee to the U. S. Section, concerned with a preliminary study and compilation of a report on the use of Uniform Weights and Measures, R. E. Flanders
U. S. Shipping Board, Fuel Conservation Board, H. L. Seward.
National Safety Council, American Society of Safety Engineers, Engineering Section, Study of Low Voltage Electrical Hazard, John Price Jackson.

Representations on the special committees of the American Welding Society and the American Bureau of Welding:

Welding of Pressure Vessels, W. F. Durand, R. L. Daugherty, E. R. Fish, Sherwood F. Jeter, and D. S. Jacobus.
Gas Welding Committee of the American Bureau of Welding, James Partington and C. W. Obert.
American Bureau of Welding Advisory Board to the National Research Council, James Partington.
Structural Steel Welding, Advisory Committee to the American Bureau of Welding, Geo. A. Orrok.

HONORARY MEMBERS

	Elected
Sir John A. F. Aspinall	1911
W. W. Atterbury	1925
M. E. Cooley	1928
Charles de Freminville	1919
Thomas Alva Edison	1904
Rear-Admiral Robert S. Griffin	1920
Nathanael Greene Herreshoff	1921
Ira N. Hollis	1928
Herbert Hoover	1925
Henri Le Chatelier	1927
Honorable Sir Charles Algernon Parsons	1920
Grande Ufficiale Ing. Pio Perrone	1920
Auguste C. E. Rateau	1919
Charles M. Schwab	1918
Ambrose Swasey	1916
Wm. Cawthorn Unwin	1898
Samuel M. Vauclain	1920
Oskar von Miller	1912
Worcester R. Warner	1925
Right Honorable Lord Weir	1920
Orville Wright	1918
Sir Alfred Fernandez Yarrow	1914

Honorary Members in Perpetuity

Alexander Lyman Holley, Founder of the Society. Died 1882.
John E. Sweet, Founder of the Society. Elected Hon. Mem. 1916. Died 1916.
Henry Rossiter Worthington, Founder of the Society. Died 1880.

Deceased Honorary Members

	Elected	Died
Horatio Allen	1880	1889
Sir William Arrol	1905	1913
Sir Benjamin Baker	1886	1907
Johann Bauschinger	1884	1893
Sir Henry Bessmer	1891	1898
Sir Frederick Bramwell	1884	1904
John A. Brashear	1908	1920
Gustave Canet	1900	1908
Andrew Carnegie	1907	1919
David K. Clark	1882	1896
Rudolph Clausius	1882	1888
Sir John Coode	1889	1892
Peter Cooper	1882	1883
Carl Gustaf Patrik de Laval	1912	1913
Rudolph Diesel	1912	1913
James Dredge	1886	1906
V. Dwelshauvers-Dery	1886	1913
Alexander Gustave Eiffel	1889	1923
Marshal Ferdinand Foch	1921	1929
Sir Charles Douglas Fox	1900	1921
John Fritz	1900	1913
Major-General George W. Goethals	1917	1928
Franz Grashof	1884	1893
Otto Hallauer	1882	1883
Charles H. Haswell	1905	1907
Friedrich Gustav Hermann	1884	1907
Gustav Adolph Hirn	1882	1890
Joseph Hirsch	1889	1901
Robert W. Hunt	1920	1923
Benjamin Franklin Isherwood	1894	1915
Henri Léauté	1891	1918
Erasmus D. Leavitt	1915	1916
Anatole Mallet	1912	1919
Charles H. Manning	1913	1919
Rear Admiral George W. Melville	1910	1912
Charles T. Porter	1890	1910
Sir Edward J. Reed	1882	1906
Franz Reuleaux	1882	1905
Henri Schneider	1882	1898
C. William Siemans	1882	1883
Henry R. Towne	1921	1924
Henri Tresca	1882	1885
Francis A. Walker	1886	1897
Sir William H. White	1900	1913
George Westinghouse	1897	1914

PAST OFFICERS

Alexander L. Holley. Chairman of the Meeting for Organization of The American Society of Mechanical Engineers.......Died January 29, 1882

Presidents

1880-1882	R. H. Thurston	Died October 25, 1903
1883	E. D. Leavitt	Died March 11, 1916
1884	John E. Sweet	Died May 8, 1916
1885	J. F. Holloway	Died September 1, 1896
1886	Coleman Sellers	Died December 28, 1907
1887	George H. Babcock	Died December 16, 1893
1888	Horace See	Died December 14, 1909
1889	Henry R. Towne	Died October 15, 1924
1890	Oberlin Smith	Died July 19, 1926
1891	Robert W. Hunt	Died July 11, 1923
1892	Charles H. Loring	Died February 5, 1907
1893-1894	Eckley B. Coxe	Died May 13, 1895
1895	E. F. C. Davis	Died August 6, 1895
1895	Charles E. Billings	Died June 4, 1920
1896	John Fritz	Died February 13, 1913
1897	Worcester R. Warner	Cleveland, Ohio
1898	Charles Wallace Hunt	Died March 27, 1911
1899	George W. Melville	Died March 17, 1912
1900	Charles H. Morgan	Died January 10, 1911
1901	S. T. Wellman	Died July 11, 1919
1902	Edwin Reynolds	Died February 19, 1909
1903	James M. Dodge	Died December 4, 1915
1904	Ambrose Swasey	Cleveland, Ohio
1905	John R. Freeman	Providence, R. I.
1906	F. W. Taylor	Died March 21, 1915
1907	Frederick R. Hutton	Died May 14, 1918
1908	M. L. Holman	Died January 4, 1925
1909	Jesse M. Smith	Died April 1, 1927
1910	George Westinghouse	Died March 12, 1914
1911	E. D. Meier	Died December 15, 1914
1912	Alex C. Humphreys	Died August 14, 1927
1913	W. F. M. Goss	Died March 23, 1928
1914	James Hartness	Springfield, Vt.
1915	John A. Brashear	Died April 8, 1920
1916	D. S. Jacobus	New York, N. Y.
1917	Ira N. Hollis	Cambridge, Mass.
1918	Charles T. Main	Boston, Mass.
1919	Mortimer E. Cooley	Ann Arbor, Mich.
1920	Fred J. Miller	Centre Bridge, Pa.
1921	Edwin S. Carman	Cleveland, Ohio
1922	Dexter S. Kimball	Ithaca, N. Y.
1923	John Lyle Harrington	Kansas City, Mo.
1924	Fred R. Low	New York, N. Y.
1925	W. F. Durand	Stanford Univ., Calif.
1926	W. L. Abbott	Chicago, Ill.
1927	Charles M. Schwab	New York, N. Y.
1928	Alex Dow	Detroit, Mich.

Note.—According to the Constitution, Article C7, Sec. 2, the last five surviving Past-Presidents are members of the Council.

Vice-Presidents

Henry Rossiter Worthington	April-December, 1880
Coleman Sellers	April, 1880-November, 1881
Eckley B. Coxe	April, 1880-November, 1881
Quincy A. Gilmore	April, 1880-December, 1880
Wm. H. Shock	April, 1880-November, 1882
Alexander L. Holley	April, 1880-January, 1882
Francis A. Pratt	December, 1880-November, 1881
Theo. N. Ely	1881-November, 1882
Washington Jones	1881-November, 1882
Wm. P. Trowbridge	1881-November, 1883
E. D. Leavitt	1881-December, 1882
Chas. E. Emery	1881-1883
S. B. Whiting	1882-1883
John Fritz	1882-1884
Henry Morton	1882-1884
Wm. Metcalf	1882-1884
A. B. Couch	1883-1885
W. R. Eckart	1883-1885
J. V. Merrick	1883-1885
Chas. W. Copeland	1884-1886
Henry R. Towne	1884-1886
Coleman Sellers	1884-1885
Olin H. Landreth	1885-1886
Allan Stirling	1885-1887
Horace See	1885-1887
Chas. H. Loring	1885-1887
Jos. Morgan, Jr.	1886-1888
Chas. T. Porter	1886-1888
Horace S. Smith	1886-1888
W. S. G. Baker	1887-1889
H. G. Morris	1887-1889
C. J. H. Woodbury	1887-1889
Thos. J. Borden	1888-1890
William Kent	1888-1890
Charles B. Richards	1888-1890
De Volson Wood	1889-1891
Joel Sharp	1889-1891
Geo. W. Weeks	1889-1891
Stephen W. Baldwin	1890-1892
Alex. Gordon	1890-1892
Jno. F. Parkhurst	1890-1892
George I. Alden	1891-1893
E. F. C. Davis	1891-1893
Irving M. Scott	1891-1893
Charles Wallace Hunt	1892-1894
Edwin Reynolds	1892-1894
Thos. R. Pickering	1892-1894
Percival Roberts, Jr.	1893-1895
H. J. Small	1893-1895
Charles E. Billings	1893-1895
Frank H. Ball	1894-1896
M. L. Holman	1894-1896
Jesse M. Smith	1894-1896
Francis W. Dean	1895-1897
Charles H. Manning	1895-1897
George W. Melville	1895-1897
Edwin S. Cramp	1896-1898
W. F. Durfee	1896-1898
S. T. Wellman	1896-1898
Charles M. Jarvis	1897-1899
Walter S. Russel	1897-1899
John C. Kafer	1897-1899
E. D. Meier	1898-1900
George R. Stetson	1898-1900
B. H. Warren	1898-1900
Jesse M. Smith	1899-1901
Stevenson Taylor	1899-1901
David Townsend	1899-1901
James M. Dodge	1900-1902
Ambrose Swasey	1900-1902
Arthur M. Waitt	1900-1902
M. E. Cooley	1901-1903
Wilfred Lewis	1901-1903
M. P. Higgins	1901-1903
James Christie	1902-1904
F. H. Daniels	1902-1904
John R. Freeman	1902-1904
D. S. Jacobus	1903-1905
William J. Keep	1903-1905
M. L. Holman	1903-1905
S. M. Vauclain	1904-1906
H. H. Westinghouse	1904-1906
Fred. W. Taylor	1904-1905
Geo. W. Barrus	1905-1906
Walter M. McFarland	1905-1907
Robt. C. McKinney	1905-1907
Edward N. Trump	1905-1907
Philetus W. Gates	1906-1908
John W. Lieb, Jr.	1906-1908
Alex Dow	1906-1908
L. P. Breckenridge	1907-1909
Fred. J. Miller	1907-1909
Arthur West	1907-1909
Geo. M. Bond	1908-1910
R. C. Carpenter	1908-1910
F. M. Whyte	1908-1910
Chas. Whiting Baker	1909-1911
W. F. M. Goss	1909-1911
E. D. Meier	1909-1910
Alex. C. Humphreys	1910-1911
Geo. M. Brill	1910-1912
Edwin M. Herr	1910-1912
Henry H. Vaughan	1910-1912
Wm. F. Durand	1911-1913
Ira N. Hollis	1911-1913
Thos. B. Stearns	1911-1913
I. E. Moultrop	1912-1914
H. G. Stott	1912-1914
James Hartness	1912-1913
E. B. Katte	1913-1914
H. L. Gantt	1913-1915
E. E. Keller	1913-1915
H. G. Reist	1913-1915

Henry Hess	1914-1916
Geo. W. Dickie	1914-1916
James E. Sague	1914-1916
Wm. B. Jackson	1915-1917
J. Sellers Bancroft	1915-1917
Julian Kennedy	1915-1917
Charles H. Benjamin	1916-1918
Arthur M. Greene Jr.	1916-1918
Charles T. Plunkett	1916-1918
Spencer Miller	1917-1919
Max Toltz	1917-1919
John Hunter	1917-1919
Fred R. Low	1918-1920
Henry B. Sargent	1918-1920
John A. Stevens	1918-1920
John R. Allen[1]	1920-1921
William B. Gregory[2]	1920-1921
Robert H. Fernald	1919-1921
Edward C. Jones	1919-1921
Leon P. Alford	1920-1922
John L. Harrington	1920-1922
Robert B. Wolf	1920-1922
E. A. Deeds	1921-1923
Robert Sibley	1921-1923
L. E. Strothman[3]	1921-1922
Arthur L. Rice[4]	1922
H. H. Vaughan[5]	1923
Walter S. Finlay, Jr.	1922-1924
Wm. H. Kenerson	1922-1924
Earl F. Scott	1922-1924
George I. Rockwood	1923-1925
W. J. Sando	1923-1925
H. Birchard Taylor	1923-1925
Robert W. Angus	1924-1926
Sherwood F. Jeter	1924-1926
Thos. L. Wilkinson	1924-1926
A. G. Christie	1925-1927
Wm. T. Magruder	1925-1927
Roy V. Wright	1925-1927
H. V. Coes[6]	1927
Charles L. Newcomb	1926-1928
E. O. Eastwood	1926-1928
Edwards R. Fish	1926-1928
John H. Lawrence	1927-1929
E. A. Muller	1927-1929
Newell Sanders	1927-1929
Paul Wright	1927-1929
Robert L. Daugherty	1928-1930
William Elmer	1928-1930
Charles E. Gorton	1928-1930

Managers

Wm. P. Trowbridge	April, 1880-November, 1881
Theo. N. Ely	April, 1880-November, 1881
J. C. Hoadley	April, 1880-November, 1881
Washington Jones	April, 1880-November, 1881
Wm. B. Cogswell	April, 1880-November, 1882
Chas. B. Richards	April, 1880-November, 1882
S. B. Whiting	April, 1880-November, 1882
E. D. Leavitt, Jr.	April, 1880-November, 1882
J. F. Holloway	November, 1880-November, 1883
Geo. W. Fisher	November, 1880-November, 1883
Allan Stirling	November, 1881-November, 1884
Geo. H. Babcock	1881-November, 1884
S. W. Robinson	1881-November, 1884
John E. Sweet	1882-1883
Robt. W. Hunt	1882-1885
Chas. T. Porter	1882-1885
C. J. H. Woodbury	1882-1885
W. F. Durfee	1883-1886
Oberlin Smith	1883-1886
C. C. Worthington	1883-1886
Wm. Lee Church	1884-1887
Wm. Hewitt	1884-1887
Chas. H. Morgan	1884-1887
Hamilton A. Hill	1885-1888
William Kent	1885-1888
Saml. T. Wellman	1885-1888
John T. Hawkins	1886-1889
Fredk. G. Coggin	1886-1889
Thos. R. Morgan, Sr.	1886-1889
Stephen W. Baldwin	1887-1890
Fredk. Grinnell	1887-1890
Morris Sellers	1887-1890
Frank H. Ball	1888-1891
Geo. M. Bond	1888-1891
Wm. Forsyth	1888-1891
Jas. E. Denton	1889-1892
Carleton W. Nason	1889-1892

[1] Deceased, October 26, 1920.

[2] Elected to fill unexpired term of John R. Allen.

[3] Deceased, May 8, 1922.

[4] Elected to fill vacancy caused by death of L. E. Strothman.

[5] Elected to complete term of L. E. Strothman, deceased.

[6] Under Amendments to Constitution, providing for seven Vice-Presidents (formerly only six).

H. H. Westinghouse	1889-1892
Andrew Fletcher	1890-1893
Worcester R. Warner	1890-1893
Coleman Sellers, Jr.	1890-1893
Jas. M. Dodge	1891-1894
Robt. Forsyth	1891-1894
Jesse M. Smith	1891-1894
John Thompson	1892-1895
Charles W. Pusey	1892-1895
Charles H. Manning	1892-1895
John B. Herreshoff	1893-1896
Lebbeus B. Miller	1893-1896
Walter S. Russel	1893-1896
Charles A. Bauer	1894-1897
Arthur C. Walworth	1894-1897
John C. Kafer	1894-1897
Geo. W. Dickie	1895-1898
E. D. Meier	1895-1898
Norman C. Stiles	1895-1898
A. Wells Robinson	1896-1899
H. S. Haines	1896-1899
G. C. Henning	1896-1899
J. B. Stanwood	1897-1900
H. H. Suplee	1897-1900
Geo. Richmond	1897-1900
Edgar C. Felton	1898-1901
A. M. Goodale	1898-1901
Richard H. Soule	1898-1901
Francis H. Boyer	1899-1902
John A. Brashear	1899-1902
Alfred H. Raynal	1899-1902
W. F. M. Goss	1900-1903
D. S. Jacobus	1900-1903
De Courcy May	1900-1903
Charles H. Corbett	1901-1904
H. A. Gillis	1901-1904
R. S. Moore	1901-1904
Robet. C. McKinney	1902-1905
Newell Sanders	1902-1905
S. S. Webber	1902-1905
John W. Lieb, Jr.	1903-1906
Asa M. Mattice	1903-1906
Geo. I. Lockwood	1903-1906
George M. Brill	1904-1907
Fred J. Miller	1904-1907
Richard H. Rice	1904-1907
Walter Laidlaw	1905-1908
Fred. M. Prescott	1905-1908
Frank G. Tallman	1905-1908
G. M. Basford	1906-1909
Andrew J. Caldwell	1906-1909
Andrew L. Riker	1906-1909
Wm. L. Abbott	1907-1910
Alex C. Humphreys	1907-1910
Henry G. Scott	1911-1912
H. L. Gantt	1908-1911
I. E. Moultrop	1908-1911
W. J. Sando	1908-1911
J. Sellers Bancroft	1909-1911
James Hartness	1909-1912
H. G. Reist	1909-1912
Henry G. Scott	1911-1912
D. F. Crawford	1910-1913
Stanley G. Flagg, Jr.	1910-1913
E. B. Katte	1910-1913
Charles J. Davidson	1911-1914
Henry Hess	1911-1914
George A. Orrok	1911-1914
Alfred Noble	1912-1914
Morris L. Cooke	1914-1915
W. B. Jackson	1912-1915
H. M. Leland	1912-1915
Arthur M. Greene, Jr.	1913-1916
John Hunter	1913-1916
Elliott H. Whitlock	1913-1916
Charles T. Main	1914-1917
Spencer Miller	1914-1917
Max Toltz	1914-1917
John H. Barr	1915-1918
H. de B. Parsons	1915-1918
John A. Stevens	1915-1918
Robert H. Fernald	1916-1919
William B. Gregory	1916-1919
C. R. Weymouth	1916-1919
Fred A. Geier	1917-1920
Fred N. Bushnell	1917-1920
D. Robert Yarnall	1917-1920
Charles L. Newcomb	1918-1921
Charles Russ Richards	1918-1921
Frank O. Wells	1918-1921
Elbert C. Fisher	1919-1922
Earl F. Scott	1919-1922
Dexter S. Kimball	1919-1921
L. C. Nordmeyer	1920-1923
Henry M. Norris	1920-1923
Carl C. Thomas	1920-1923
Sherwood F. Jeter	1921-1924
Horace P. Liversidge	1921-1924
Hollis P. Porter	1921-1924
A. G. Christie	1922-1925
James H. Herron	1922-1925
Roy V. Wright	1922-1925
E. O. Eastwood	1923-1926
E. R. Fish	1923-1926
Frank A. Scott	1923-1926
John R. Lawrence	1924-1927
Edward A. Muller	1924-1927
Paul Wright	1924-1927
Robt. L. Daugherty	1925-1928
Wm. Elmer	1925-1928
Chas. E. Gorton	1925-1928
Paul Doty	1926-1929
Ralph E. Flanders	1926-1929
Conrad N. Lauer	1926-1929
Frederick H. Dorner	1927-1930
William A. Hanley	1927-1930
L. B. McMillan	1927-1930
Charles M. Allen	1928-1931
Robert M. Gates	1928-1931
Ely C. Hutchinson	1928-1931

Treasurers

Lycurgus B. Moore	April, 1880—December, 1881
Chas. W. Copeland,	December, 1881—November, 1884
William H. Wiley	1884—1925
Erik Oberg	1925—date

Secretaries

Sam S. Webber, Jr.	Secretary organization meeting	1880
Lycurgus B. Moore	Acting Secretary	April—November, 1880
Thos. Whiteside Rae		November, 1880—March, 1883
Frederick R. Hutton		1883—1906
Calvin W. Rice		1906—date

SUMMARY OF MEMBERSHIP

(January 2, 1929)

Membership by Residence

United States and Possessions

Alabama	122
Alaska	2
Arizona	15
Arkansas	18
California	785
Canal Zone	4
Colorado	88
Connecticut	600
Delaware	94
District of Columbia	176
Florida	74
Georgia	135
Hawaiian Islands	26
Idaho	9
Illinois	1214
Indiana	260
Iowa	48
Kansas	58
Kentucky	58
Louisiana	103
Maine	39
Maryland	200
Massachusetts	1113
Michigan	576
Minnesota	115
Mississippi	15
Missouri	327
Montana	11
Nebraska	31
Nevada	4
New Hampshire	35
New Jersey	1370
New Mexico	4
New York	4758
North Carolina	94
North Dakota	6
Ohio	1165
Oklahoma	88
Oregon	62
Pennsylvania	2113
Philippine Islands	31
Porto Rico	34
Rhode Island	157
South Carolina	38
South Dakota	6
Tennessee	112
Texas	226
Utah	49
Vermont	34
Virginia	137
Washington	127
West Virginia	57
Wisconsin	384
Wyoming	8
Total	17415

OTHER COUNTRIES

NORTH AMERICA		
Canada	262	
Newfoundland	1	
Mexico	31	
		294

CENTRAL AMERICA		
Costa Rica	4	
Honduras	1	
Panama	1	
Salvador	1	
		7

WEST INDIES		
Aruba	1	
Bermuda	1	
Cuba	47	
Dominican Republic	7	
Haiti	1	
Trinadad	1	
		58

SOUTH AMERICA		
Argentina	25	
Bolivia	1	
Brazil	17	
British Guiana	1	
Chile	21	
Colombia	7	
Ecuador	2	
Peru	7	
Uruguay	2	
Venezuela	5	
		88

AFRICA		
Egypt	2	
Liberia	1	
Natal	1	
Union of S. Africa	10	
		14

ASIA		
Ceylon	1	
China	18	
Dutch East Indies	3	
Federated Malay States	1	
India	46	
Japan	29	
Manchuria	1	
Persia	1	
Siam	1	
Straits Settlements	1	
		102

AUSTRALASIA		
American Samoa	1	
Australia	32	
New Zealand	2	
		35

EUROPE		
Austria	3	
Belgium	3	
Czechoslovakia	8	
Denmark	8	
Finland	2	
France	33	
Germany	49	
Great Britain	110	
Greece	1	
Holland	5	
Hungary	1	
Italy	7	
Norway	5	
Poland	3	
Roumania	2	
Russia	3	
Spain	10	
Sweden	13	
Switzerland	9	
Syria	1	
Turkey	2	
		278
Total		876

TOTAL MEMBERSHIP BY RESIDENCE

Membership in United States	17415
Membership in Other Countries	876
Present Address Unknown	4
Total	18295

Membership by Grades

Honorary Members	23
Members	8472
Associates	623
Associate-Members	3993
Juniors	5184
Total	18295

Annual Reports of Council and Committees

REPORT OF COUNCIL

THE Council presents its annual report for 1928 on the occasion of the Forty-Ninth Annual Meeting of the Society.

Under the amended Constitution of The American Society of Mechanical engineers the Council is now comprised of a President, five Past-Presidents, seven Vice-Presidents, nine Managers, and the Chairmen of sixteen Standing Committees of Council, with the Treasurer and the Secretary elected by the Council. (The names of the Council for 1928 will be found on page 57.)

This report gives only an introduction to the varied activities of the Society, both to the general classifications and to the work of the standing committees, leaving to the appended reports from the Committees of Council the more detailed statements of their work. The Secretary will be pleased to send to any member the separate reports of any of the activities in which the A.S.M.E. is represented and which are not covered by the appendices.

General Activities

In addition to the standing-committee and the special-committee activities, the Society is represented in regular assignments, some of which are Founder Society activities. The list for 1928 follows, covering the various phases of the Society's representations: United Engineering Society; Engineering Foundation; Engineering Societies Library; Employment Service; John Fritz Medal Board of Award; American Engineering Council, on which the Society has nineteen members, one representative for every thousand members; Washington Award, two representatives, under the general administration of the Western Society of Engineers; U. S. National Committee of the International Electrotechnical Commission; American Standards Association (formerly the American Engineering Standards Committee); Engineering Educational Survey, Board of Investigation and Coordination, as directed by the Society for the Promotion of Engineering Education; American Association for the Advancement of Science, Section M — Engineering (this year the Society is assisting in the preparation of the technical program for its annual meeting to be held in New York); Joseph A. Holmes Safety Association; National Research Council, Division of Engineering; National Conference, Safety on Highways; American Committee, World Power Conference; World Engineering Congress, Japan, 1929.

By invitation the Society has representatives on: the National Committee on Metals Utilization, Department of Commerce; National Conference on Street and Highway Safety, Department of Commerce; Committee on Standardization Survey; National Research Council, Highway Research Committee; National Screw Thread Commission; International High Commission, Advisory Committee to the U. S. Section, concerned with a preliminary study and compilation of a report on the use of Uniform Weights and Measures; U. S. Shipping Board, Fuel Conservation Board; National Safety Council, American Society of Safety Engineers, Engineering Section, Study of Low-Voltage Electrical Hazard; and Special Committees of the American Welding Society and the American Bureau of Welding, as follows: Welding of Pressure Vessels; Gas Welding Committee; Advisory Board to the National Research Council; and Structural Steel Welding Advisory Committee.

The Society is contributing to the Summer School for engineering teachers, conducted by the Society for the Promotion of Engineering Education at Purdue University, having for its purpose the improvement in methods of instruction in the engineering colleges.

A plan for joint cooperation with other societies in International Management Congresses has been approved and is being carried out in cooperation with the Society's Professional Division on Management.

Another activity, in which the Local Sections Committee has led, has been cooperation with the Institute of International Education in the placing of foreign engineering graduates in American industry, for a period of two years. The Institute cares both for foreign students in America and for an exchange for American students abroad.

Membership

A summary of the membership changes, covering the fiscal year of the Society, is given in the accompanying table.

At the date of this report, the membership numbers 19,082. The report of the Membership Committee covering the fiscal year gives the figures on the applications for membership that have been scrutinized by that Committee, and other business that comes under the supervision of the Standing Committee on Membership.

We have lost by death our Honorary Member, General George W. Goethals, and our Past-President, Dr. W. F. M. Goss.

We have elected to Honorary Membership Professor Henri le Chatelier for his work in introducing new methods of physico-chemical analysis, now considered so indispensable in all metal-working establishments. He has also been one of the leaders in France in the science of management, as developed by our former President, F. W. Taylor.

Honorary Membership has also been awarded to our Past-Presidents, Ira N. Hollis and Mortimer E. Cooley, in recognition of the many years of devoted service rendered to the Society and their profession, exemplifying as they have the highest ideals of service to the engineering profession and to mankind, and for their outstanding work in the field of engineering education.

MEMBERSHIP CHANGES—OCTOBER 1, 1927, TO SEPTEMBER 30, 1928

	Membership			Losses			Additions		Totals		
	Oct. 1, 1927	Sept. 30, 1928	Transferred from	Resigned	Dropped	Died	Transferred to	Elected	Loss	Gain	Change
Honorary Members	21	21				1	1		1	1	0
Life Members	77	77				2	2		2	2	0
Members	8349	8550	32	41	169	126	127	442	368	569	201+
Associates	642	644	9	6	12	2		31	29	31	2+
Associate-Members	4232	4184	77	28	224	8	66	223	337	289	48—
Juniors (20)	871	904	46	14	95	2	190		157	190	33+
Juniors (10)	3890	4368	222	23	213	7		943	465	943	478+
	18082	18748	386	112	713	148	386	1639	1359	2025	666

Several members of the A.S.M.E. have received exceptional honors during the last year, as follows:

Thomas A. Edison, Honorary Member, was awarded the Congressional Medal as a tribute "to the greatest economic benefactor of the race since Prometheus stole the fire from Heaven."

Charles M. Schwab, Past-President and Honorary Member, was awarded the Bessemer Medal by the Iron and Steel Institute of Great Britain, as a "formal recognition of a work and a man already assured of a permanent place in the history of his industry and his country."

Henry Ford was awarded the Cresson Medal by the Franklin Institute, "in consideration of his rare inventive ability and power of organization and his outstanding executive powers and industrial leadership."

Herbert Hoover, Honorary Member, was awarded the Seaman Medal by the American Museum of Safety "in recognition of his great public service from the standpoint of human values and particularly for his conspicuous work in the Mississippi flood relief." He was awarded the John Fritz Medal, the citation accompanying the award reading: "To Herbert Hoover, Engineer, Scholar, Organizer of Relief to War-Stricken Peoples, Public Servant." On November 6, 1928, Mr. Hoover was elected President of the United States.

Meetings — Council and Society

The Council has held seven meetings during the year, inclusive of its sessions in connection with the Spring and Annual Meetings. The Executive Committee of the Council has acted on emergency matters between meetings of the Council.

The Society meetings are reported by the Committee on Meetings and Program, the Committee on Professional Divisions, the Committee on Local Sections, and the Committee on Relations with Colleges. (At the close of the year 1928 there were 16 Professional Divisions, 70 Local Sections, and 94 Student Branches.)

In addition to attending the Council meetings, President Dow has made several trips to meetings of the Professional Divisions and Local Sections, and on many occasions has appointed Past-Presidents and members of Council as special representatives at meetings.

Plans are well under way for the celebration of the Fiftieth Anniversary of the Society, to be held in Washington, D. C., during the week beginning April 7, 1930. The Society held its organization meetings at Stevens Institute of Technology in 1880, and an appropriate program will be presented there preceding the Washington meeting.

Publications

The Committee this year has carried out the plans developed during the last administrative year, and in January, 1928, the Engineering Index Service was instituted. It reviews 1,700 technical periodicals. This requires translation into English from 17 languages of 37 different countries. The Publications Committee, Finance Committee, and Council have with courage backed this enterprise, looking upon it in its broader sense as a distinct contribution which the Society can make to research, supplementing and assisting the great research work which is now generally undertaken by industry throughout the United States. There is an advisory board, composed of representatives from other organizations, and although the A.S.M.E. is carrying the financial burden, we look to these organizations for advice and counsel to make the Index a comprehensive digest of periodical literature in all fields of science and engineering.

Under the new plan for publishing the Transactions of the Society, there have been issued 23 sections which include the contributions from 14 Professional Divisions and other papers accepted by the Publications Committee. (A total of 36 setions for the year will be issued.)

Mechanical Engineering and the *A.S.M.E. News* have been issued regularly.

The record and Index for 1927 was published and includes a comprehensive index to the papers presented during 1927 if published by the Society in any form. It serves further as a reference book containing some of the material formerly published in the Year Book. The contents of the latter, now known as the Membership List, have been reduced somewhat.

AWARDS

The Council reports for record the following official awards of the Society for 1928:

Holley Medal to Elmer Ambrose Sperry "for achievements that have contributed greatly to the progress of civilization and for many inventions that have advanced the naval arts, including the gyroscopic compass which has freed navigation from the dangers of a fluctuating magnetic compass."

A.S.M.E. Medal to Julian Kennedy "for his services and contributions to the iron and steel industry."

Junior Award to M. D. Aisenstein of Berkeley, California, for his paper on "A New Method of Separating the Hydraulic Losses in a Centrifugal Pump."

Student Award to Clarence C. Franck of Johns Hopkins University for his paper on "Condition Curves and Reheat Factors for Steam Turbines."

Charles T. Main Award, 1928, to Robert M. Meyer of the Newark College of Engineering for his paper on "Scientific Management and Its Effect on Manufacturing."

The Society acted as custodian of a fund of $17,500 offered by the Lincoln Electric Company of Cleveland, Ohio, which covered a worldwide competition for the best three papers disclosing advancement in the art of arc welding, presented under the rules of the competition.

Three prizes were awarded, $10,000, $5,000, and $2,500. The Committee of Judges was constituted as follows:

American Welding Society, S. W. Miller.
American Institute of Electrical Engineers, Comfort A. Adams.
American Society of Civil Engineers, Henry Goldmark and F. T. Llewellyn.
Department of Commerce, Bureau of Standards, George K. Burgess.
The American Society of Mechanical Engineers, L. P. Alford, Chairman, W. F. Durand, R. H. Fernald.
Lincoln Electric Company—two advisors, J. C. Lincoln, president, and J. F. Lincoln, vice-president.

The report of the Committee of Judges was made in April, 1928, after consideration of seventy-seven papers submitted, and the prizes were awarded at the Spring Meeting of the Society at Pittsburgh.

The first prize, of ten thousand dollars ($10,000), was awarded to James W. Owens, director of welding of the Newport News Shipbuilding & Dry Dock Co. Mr. Owens' prize-winning paper, entitled "Arc-Welding — Its Fundamentals and Economics," is a treatise on arc-welding design and shop practice and an analysis of its industrial applications and world-wide possibilities.

The second prize, of five thousand dollars ($5,000), was awarded to Prof. H. Dustin for his paper on "Fundamental Principles of Arc Welding." Professor Dustin is on the faculty of applied science of the University of Brussels, Belgium.

Commander H. E. Rossell, head of the Mathematics Department of the United States Naval Academy, received the third prize, twenty-five hundred dollars ($2,500), for his paper on "Electric Welding of Ships' Bulkheads and Similar Plated Structures."

Two other papers received honorable mention, one by Frank B. Walker, of Boston, Mass., on "Theory and Application of the Base Plate Arc-Welded Rail Joint," and the other by B. K. Smith, of Houston, Texas, on "Stable Arc Welding on Long Distance Pipe Lines."

Technical Committees, Special Appointments, and Exchange of Courtesies

The technical Standing Committees on Research, Standardization, Power Test Codes, and Safety, and the Special Committees, such as Boiler Code, with their many sub-committees, not only serve without remuneration, but by their services, interest, and time contribute to the development of standards and investigations and to the general progress of industry. These committees and sub-committees have a total membership of over 1,218.

In addition to all the regular appointments for general and inter-society relations, in response to special invitations from universities, associations, and special congresses, each year the President is called upon to appoint many Honorary Vice-Presidents.

Some interesting events in which the Society was represented were as follows:

U. S. National Committee of the International Electrotechnical Commission, the Hague Conference at the meeting of the Steam Turbine Advisory Committee of the International Electrotechnical Commission. The meeting was truly international in character, eight nations being represented by twenty-three delegates. The United States was represented at the meeting by I. E. Moultrop and Francis Hodgkinson, and C. B. LePage, Assistant Secretary, A.S.M.E., attended the meeting as Assistant Director of the Secretariat to the Advisory Committee.

Clyde R. Place, chairman, George A. Horne, Chas. S. Hoffman, William McClellan, Stephen F. Voorhees, and Richard A. Wolff acted as an advisory committee to report to the Board of Estimate and Apportionment of the City of New York on a general determination of the advisability of requiring that contractors have unquestioned resources.

Edwards R. Fish, Vice-President, represented the Society on the presentation of the formal resolutions of the Founder Societies in appreciation of the tributes paid to the skill and devoted service of Clifford M. Holland, Milton H. Freeman, and Ole Singsted, chief engineers of the Holland Vehicular Tunnel, and to their engineering assistants, upon the occasion of the formal opening of the tunnel on November 12, 1927.

On July 4, 1928, at Louvain, Belgium, Laurence V. Benét and H. S. Downe of France, and Clarke Freeman of the United States, officially represented the A.S.M.E. at the presentation and dedication of the clock and carillon, the gift of engineering societies in America to the University of Louvain and to Belgium.

Special resolutions and felicitations were sent to the Association of United States Engineers in France, an organization in which all of the Founder Societies are represented and interested.

The following were some of the special appointments made during the year:

American Mining Congress on Underground Power Transmission and Power Equipment for Metal Mines, W. K. Liggett.
U. S. Government Advisory Committee, Bi-centenary celebration of the birth of George Washington (1932), Gano Dunn.
Verein deutscher Ingenieure, Berlin Annual Meeting, Max Toltz.
Pedestrian Safety League, Committee on Safety, Lew R. Palmer.
American Academy of Political and Social Science, William Elmer, Charles Penrose, and R. S. McConnell.
U. S. Department of Commerce, Conference on Simplified Practice, Hack Saw Blades, F. S. Walters.
Institution of Civil Engineers, London, Centenary Celebration, Alex Dow.

Among special committees appointed by the President at the direction of the Council, are:

Economic Status of the Engineer, Conrad N. Lauer, Chairman, D. S. Kimball, C. F. Hirshfeld, W. A. Starrett, H. L. Whittemore, H. B. Oatley, and Calvin W. Rice, Secretary.

Revenues of the Society, W. L. Batt, Chairman, D. S. Kimball, R. E. Flanders, C. N. Lauer, Erik Oberg, J. D. Cunningham, J. L. Walsh, and Calvin W. Rice, Secretary. The Chairman of the Finance Committee and the Chairman of the Meetings and Program Committee act as advisory members of the Committee.

The complete list of all committees was published in the Membership List for 1928, and will be published in the Record and Index for this year. (See page 58, et seq.)

The Society of Military Engineers of Washington, D. C., was added to the list of organizations with which the Society has official exchange of courtesies.

The Society received a unique gift from Baron C. Shiba, head of the Aeronautic Research Institute of the Tokyo Imperial University of

Japan, of an aerodynamic film in which moving-picture photographs were taken at the rate of 20,000 per second.

Finances

Through the *A.S.M.E. News* the membership has been kept informed, by graphic reports, of "How the A.S.M.E. Spends Its Income."

The appended report of the Finance Committee includes the report of the auditors covering the fiscal year, October 1, 1927, to September 29, 1928.

The Society is gaining prestige as the result of the foresight of members who have placed in our custody funds for the advancement of the profession, through research, and for the benefit of students. The Council and Finance Committee are giving these funds especial care. Special detailed reports on trust funds are made each year to the Council and to the donors of the funds.

Conclusion

It has been well said, that "every man is debtor to his profession, and we owe it to the whole body of engineers to face public responsibility soberly, and to give it a reasonable share of our time, and the best of our judgment all the time."

The Council of the A.S.M.E. in making its annual report reviews with special pride the unselfish contributions which the members of the Society are making to the profession, as members of committees and as representatives of the Society and of the profession in the varied and ever-widening activities of the engineer and of the A.S.M.E. as the Society of the Industries.

Calvin W. Rice,
Secretary.

REPORTS OF COMMITTEES

The A.S.M.E. Council reports for record the review of the work of the Standing Committees of the Council and the Boiler Code Committee, as follows:

Finance

In presenting its annual report, the Finance Committee takes pleasure in reaffirming the strong financial position of the Society. The year brought two developments of importance — the establishment of the new Engineering Index Service and the inauguration of the policy of appropriating from the surplus of one fiscal year for expenditure during the following year.

The new Engineering Index Service was possible only because the Society had an invested capital of over $300,000 against which a loan could be made to finance the new activity initially. This ability to finance new projects of great importance to engineering and industry is the best evidence that the Society is on a sound financial basis. $63,792.08 is the amount invested in the first year's activity. A smaller amount will be required during the next year. The Finance Committee has accepted a goodly responsibility with the Committee on Publications and the staff in the preliminary plans for this valuable service.

The excess of income over expenditures was $57,571.74, $10,000 of which was set aside for expenditures during the fiscal year 1928-1929. This is the first time this procedure has been followed. It is a recognition of the fact that the initiation fees and interest on investments for capital account which go automatically to reserve under the By-Laws and Rules will be sufficient, in the judgment of Council and the Finance Committee, to maintain the reserve at a satisfactory level except in time of emergency.

The table (page 96) giving the condensed comparison of balance sheets for the fiscal year ending September 29, 1928, with that of the previous year reveals differences in nearly all of the items except Accounts Receivable, Contributions for Research, and Dues Paid in Advance. Although Contributions for Research showed little change, these funds were quite active during the year, approximately $35,000 flowing in and out. This is a real indication of the strong position the Society has taken in stimulating research projects which are to be supported by industry. The Society administers the funds, pays interest on them, and renders regular reports of income and expenditure. An explanation of the differences in the two balance sheets follows:

Cash: $44,000 worth of bonds invested in the Capital Account came due just before the close of the year and the cash was used for current financing, leaving a larger amount than usual in cash.

Inventory: The increase in inventory of $17,666.27 is in publications in process of manufacture and in stock for sales. While this is in accord with the increased volume of publications sold during the last year, as compared with the previous year, about half of the increase is due to publications completed late in the fiscal year. It is expected that this will be liquefied early in the coming year.

Deferred Charges: The increase of $62,681.86 in this item is due to the loan of $63,792.08 to the new Engineering Index Service previously discussed.

Investments in Trust Funds: The decrease of $15,425.96 is due to the fulfillment of the trust for the Lincoln Arc Welding Prizes. The prizes were awarded in May, 1928, at the Pittsburgh Meeting, and the fund of $17,500.00 then closed out.

Investments for Capital Account: A block of bonds carried at $44,521.88 came due in September, 1928. The proceeds, used temporarily in current financing over the close of the fiscal year, were reinvested in legal securities immediately after the new fiscal year opened.

Fixed Assets: The increase in fixed assets is made up of an increase in the valuation of the building and in the addition of furniture and equipment used by the Society.

BALANCE SHEET AS OF SEPTEMBER 29, 1928

ASSETS

Cash		$8,999.20
Accounts Receivable:		
Members	$23,516.82	
Non-Members	114,151.56	
		137,668.38
Temporary Investments for Working Capital:		
First Mortgage and Mortgage Bonds 5½%	2,000.00	
Savings Banks	6,011.55	
		8,011.55
Inventories:		
Supplies	25,159.41	
Publications in Process	14,465.15	
Publications for Sale	27,333.08	
		66,957.64
Investments for Trust Funds (see contra):		
First Mortgage and Mortgage Bonds on Real Estate 5½%	56,000.00	
St. Louis, Peoria & N. W. R. R. 5%	10,613.89	
N. Y. Central-Hudson River R. R. 4%	23,062.50	
Stock Shares (J. R. Freeman)	25,974.53	
Cash in Banks	159.19	
		115,810.11
Investments for Capital Account (see contra):		
First Mortgage and Mortgage Bonds on Real Estate 5½%	232,500.00	
Alabama P. & L. Co. 5%—1951	5,000.00	
Texas P. & L. Co. 5%—1956	4,850.00	
Dallas P. & L. Co. 5%—1952	5,000.00	
San Diego Cons. G. & E. 5%—1947	5,075.00	
Binghamton L., H. & P. 5%—1946	5,000.00	
Commonwealth Edison Co. 5%—1953	5,118.75	
Metropolitan Edison Co. 5%—1953	5,012.50	
Public Service Co. of Ill. 5%—1966	4,962.50	
Cumberland P. & L. Co. 4½%—1956	4,725.00	
Baltimore & Ohio R. R. 5%—2000	5,115.00	
Baltimore & Ohio R. R. 4½%—1933	4,947.50	
		287,306.25
Fixed Assets (Book values):		
Building and Equipment	513,507.63	
Library Books	1.00	
Engineering Index	1.00	
		513,509.63
Deferred Charges:		
Office rearrangement	11,611.49	
Activities rearrangement	6,053.18	
Loan to New Engineering Index Service (including furniture)	63,792.08	
Loan to Steam Table Fund	5,442.34	
		86,899.09
		$1,225,161.85

LIABILITIES

Unfilled Obligations		$41,860.60
Gleason gift for Thurston Biography		1,750.00
Accounts Payable		15,469.88
Custodian Funds:		
Absorption of Radiant Heat in Boilers	$41.50	
Airplane Dynamics	250.00	
Boiler Feedwater Studies	1,893.83	
Boiler Feedwater Studies Committee No. 3	50.00	
Boiler Feedwater Studies Committee No. 5	50.00	
Boiler Refractories	2,631.39	
Condenser Tube	102.26	
Cutting and Forming of Metals	2.84	
Cutting Fluids	19.02	
Elevator Safeties	19,755.50	
Existing Supplies of Hardwood	560.75	
Fluid Meter	1,317.30	
Fuels	64.68	
Gear	761.03	
Lubrication	28.74	
Mechanical Springs	1,553.39	
Oil Power National Conference	57.53	
Properties of Metals	2,298.80	
Saws and Knives	119.74	
Spark Arresters	100.00	
Standardization of Bolts, Nuts, Rivets	568.23	
Steam Table (See Loan)	....	
Textile	197.15	
Fusion-Welded Pressure Vessels	7.54	
Worm Gear	135.55	
Strength of Cylindrical Vessels	92.76	
Diesel-Oil Specifications	200.00	
		32,859.53
Dues Paid in Advance		2,824.41
Trust Funds (see contra):		
Life Membership	52,550.75	
Library Development	5,964.86	
Weeks Legacy	2,380.98	
Melville	1,618.73	
Charles T. Main	3,024.95	
Hunt Memorial	309.35	
Hess Awards—Juniors and Students	2,000.00	
A.S.M.E. Research	601.63	
Westinghouse Bust	176.51	
Holley Medal	6,419.75	
Max Toltz	14,534.02	
John R. Freeman	26,228.58	
		115,810.11
Capital Investment:		
In Fixed Assets (see contra)	513,509.63	
Reserve for Retirement Allowance	15,200.00	
Appropriated for Investment	272,106.25	
Working Capital	203,771.44	
		1,004,587.32
1927-1928 Income set aside for 1928-1929 appropriation		10,000.00
		$1,225,161.85

Unfilled Obligations: The comparison in detail for this item for the past two years is:

	Sept. 30, 1927	Sept. 29, 1928
Liabilities for Unfilled Commitments	$36,183.41	$41,860.60
Gleason Gift for Thurston Biography		1,750.00
Accounts Payable	14,475.76	15,469.88
	$50,659.17	$59,080.48

The increase in liabilities for unfilled commitments is due to emergency items added just prior to the close of the fiscal year.

Trust Funds: This is a balancing item previously explained.

CONDENSED COMPARISON OF BALANCE SHEETS

Assets

	Sept. 30, 1927	Sept. 29, 1928	Net Change During the Fiscal Year
Cash	$8,684.19	$17,010.75	+ $8,326.56
Accounts Receivable	137,090.54	137,668.38	+ 577.84
Inventory	49,291.37	66,957.64	+ 17,666.27
Deferred Charges	24,217.23	86,899.09	+ 62,681.86
Investments for Trust Funds	131,236.07	115,810.11	− 15,425.96
Investments for Capital Account	316,328.13	287,306.25	− 29,021.88
Fixed Assets	506,118.62	513,509.63	+ 7,391.01
Total Assets	$1,172,966.15	$1,225,161.85	+$52,195.70

Liabilities

	Sept. 30, 1927	Sept. 29, 1928	Net Change During the Fiscal Year
Unfilled Obligations	$50,659.17	$59,080.48	+ $8,421.31
Contributions for Research	32,049.49	32,859.53	+ 810.04
Dues Paid in Advance	2,205.84	2,824.41	+ 618.57
Trust Funds	131,236.07	115,810.11	− 15,425.96
Capital	956,815.58	1,004,587.32	+ 47,771.74
Set Aside for Expenditure during 1928-1929		10,000.00	+ 10,000.00
Total Liabilities	$1,172,966.15	$1,225,161.85	+$52,195.70

CONDENSED STATEMENT OF INCOME AND EXPENDITURES

Income

	1926-1927	1927-1928
Initiation Fees	$29,443.69	$29,772.32
Membership Fees	284,978.13	293,847.95
Accounts Receivable, Members and Non-Members	394,824.34	410,386.42
Interest	18,372.25	22,405.54
Total Income	$727,618.41	$756,412.23

Expenditures

	1926-1927	1927-1928
Administration and General	$101,829.15	$113,906.21
Initiation Fees Account	21,917.10	21,592.01
Service to Members Account	258,280.24	263,899.43
Income Producing and Professional Account	260,060.11	275,820.42
Service to Public Account	22,701.86	23,079.07
	$664,788.46	$698,297.14
Plus Preceding Year's Over-Expenditure on Condensed Catalogues	614.47	543.35
	$665,402.93	$698,840.49
Balance of Income over Expenditures	$62,215.48	$57,571.74

Capital: This increase is best shown by the following table:

	Sept. 30, 1927	Sept. 29, 1928
In Fixed Assets	$506,118.62	$513,509.63
Reserve for Retirement Allowance	5,000.00	15,200.00
Appropriated for Investment	316,328.13	272,106.25
Working Capital	129,368.83	203,771.44
	$956,815.58	$1,004,587.32

Set Aside for Expenditure in 1928-1929: This item has been explained in the introductory paragraphs of this report.

This statement shows a satisfactory increase in income of about $28,800 over the income for the previous year. The expenditures increased by about $33,500 over the previous year. The surplus of income over expenditures is about $4,500 less than last year. As $10,000 of this surplus is budgeted for expenditure during 1928-1929, the total amount to reserve for the year is $47,571.74. The income from initiation fees, $29,772.32, must go to reserve according to the By-Laws of the Society.

Conclusion: The Society has completed a successful year financially because of strict adherence to sound principles of administration and finance. The funds entrusted to the Society have been carefully administered.

Wm. J. Struss & Co., certified public accountants, give the results of their examination of the books of the Society for the fiscal year ended September 29, 1928, in the statement of assets and liabilities on pages 94 and 95.

Meetings and Program

Three excellent meetings were held during the year 1927-1928,—the regular Annual Meeting of the Society in New York, December 5 to 9, 1927, a Spring Meeting at Pittsburgh, Pa., May 14 to 17, 1928, and a Summer Meeting at St. Paul-Minneapolis, August 27 to 30, 1928. Ninety-three papers and 19 reports were given at 46 sessions; 82 committee meetings and conferences were held in conjunction with the meetings, and the total attendance was 3522.

The Annual Meeting

The policy of stressing the opportunity which Society meetings afford for discussion of papers brought additional results at the Annual Meeting. More sessions were held than during the previous year, but there were 25 fewer papers. As as result the discussion was more constructive, with more individuals participating.

In continuance of its efforts to improve the manner of presenting papers before the Society, the services of a public-speaking coach were secured and he was available to instruct authors before the sessions at which their papers were presented. The results obtained were sufficient to justify further efforts in this direction, and some similar method will be followed at the coming Annual Meeting.

Features of the program were the inspiring presidential address of Charles M. Schwab; the enlightening Towne Lecture on "The Relationship between Industry and Taxation," by Prof. T. S. Adams, Professor of Political Economy, Yale University; the session on Photography held jointly with the Optical Society of America; and the presentation of the Melville Award to L. P. Alford for his paper on "Laws of Manufacturing Management." The attendance at the meeting was 2351, seven per cent greater than last year's, making still another record.

The Spring Meeting

The Spring Meeting in Pittsburgh was featured by an excellent program of papers relating to the mechanical problems of the Pittsburgh industrial district. Instructive and interesting excursions to the numerous industries were arranged and were well attended. It was also the occasion for the first award of the Holley Medal which was made to Elmer A. Sperry for the invention and reduction to practice of the gyroscopic compass. The presentation of the Lincoln arc welding prizes, offered by J. C. Lincoln, was made at the general business meeting.

The Summer Meeting

Industrial problems in the great Northwest furnished the subjects for discussion at the Summer Meeting in St. Paul-Minneapolis. At the dinner held during the meeting the speakers were Thomas D. Campbell, mechanical engineer, the largest wheat farmer in the world, who spoke on some of America's agricultural problems; and Ralph Budd, president of the Great Northern Railway, who discussed the situation of the railway industry since 1920. Agricultural problems occupied the place of honor on the program in a joint session with the American Society of Agricultural Engineers.

The social events and excursions were exceedingly well handled at this meeting. The attendance was augumented by a group who went by boat through the Great Lakes.

Future Plans

Plans are well under way for the Fiftieth Anniversary Celebration of the Society. The plans include a meeting in Washington, D. C., early in April, 1930. Invitations will be sent to the engineering societies and schools of the world, as well as the allied technical and trade associations.

In the formulation of general Society policies, an important step taken during the year was the discussion with the Committee on Local Sections of a rational plan for distributing meeting events properly and arranging them well in advance.

The installation of an amplifier in the Engineering Societies Building should assist materially in the presentation of papers before meetings of the Society.

Cooperation of Professional Divisions

In the preparation of the programs for the meetings throughout the year, the Professional Divisions have given splendid cooperation. They have been particularly helpful in getting the papers in sufficiently in advance for them to be printed and issued for solicitation of discussion prior to the meetings.

Membership

The Committee on Membership held twenty-one meetings during the fiscal year 1927-1928.

The number of applications considered in the transaction of its work and a summary showing the action taken are as follows:

Applications pending October 1, 1927	417
Applications received during fiscal year 1927-1928	1979
Total applications handled during year 1927-1928	2396
Recommended for membership	2009
Transfers denied	5
Deferred	11
Withdrawn	27
Applications pending October 1, 1928	344
Total applications handled during year 1927-1928	2396

Those recommended for membership were divided into the following grades:

Members	399
Transfers to Member	98
Associates	33
Associate-Members	276
Transfers to Associate-Member	68
Juniors	463
Juniors (R5 Rule 1)	672
Total	2009

Elections declared void	49
Resignations accepted	306
Dropped from membership	711
Deceased	143

MEMBERSHIP GAIN

Applications approved	2009
Transfers	166
Total new Members[1]	1843
Resignations, dropped, deceased and election void	1209
Net Gain in Members	634

The number of elections that were declared void are slightly less than for last year, also the resignations; on the other hand this has been counterbalanced by a slightly larger number being dropped from membership and, unfortunately, by a greater number of deaths.

The Committee is pleased to state, however, that the net gain in members for the year shows a small increase, although not quite as large as for last year.

Publications

Two important and far-reaching developments in Society publications were initiated during the year ending September 30, 1928. The Engineering Index Service was established and the procedure of issuing Transactions was changed radically.

The Engineering Index Service is a logical development of The Engineering Index which has been published by the Society since 1918. The new service provides annotations for all of the articles in the technical press of the world printed on cards and mailed to subscribers weekly. The excellent financial position of the Society made it possible for this new service to be taken up and established on a firm basis. The Finance Committee has given splendid assistance in the preliminary plans for the Index, and has maintained its interest and cooperation. The plan was approved by Council on October 8, 1927, and in the period to the first of the year an organization was built, a printing plant installed, and contracts secured. On Tuesday, January 3, 1928, the new service started,

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[1] This is not the actual gain of the Society's membership but represents those recommended for admission by the Membership Committee.

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and index cards were mailed to twenty-eight subscribers at the end of that week. In the nine months ending September 30, 34,322 articles in the technical press were annotated and cards printed and mailed. On that date there were eighty-nine subscribers.

The new publication procedure is a recognition of the importance of the Professional Divisions as well as of the fact that many published papers of the Society were being distributed to those who could not make use of them. The new scheme provides for the printing of Transactions in quarterly sections, one section for each of the Professional Divisions.

The annual volume known as the Record and Index, as its name indicates, records the administrative proceedings of the Society and an index to publications. In addition the Year Book was changed to the Membership List, and some of the informational material formerly included was transferred to the Record and Index. The success of the new procedure cannot be accurately measured. There has been a large amount of correspondence about it, due largely to the fact that the new procedure has not been understood by a number of the members. However, under the new scheme approximately thirty-one per cent more material has been published at a decreased cost of nearly two per cent.

With the first of January *Mechanical Engineering* appeared in a new cover and in a slightly smaller size, uniform with the new size of Transactions.

The publication of the *A.S.M.E. News*, the 1927 Engineering Index Annual, and the Condensed Catalogues, was carried out in the usual successful manner.

Professional Divisions

The Standing Committee on Professional Divisions reports substantial progress during the year 1928 in advancing the work of the Professional Divisions. A summary of the following four important phases of activity is appended:

(1) Sessions at Society meetings
(2) National Division meetings
(3) Surveying for research
(4) Annual progress reports.

During the past year activities have increased approximately 50 per cent over the previous year. Four Divisions held their first National Meetings during 1928, making a total of eleven Divisions that have held National Meetings. The attendance at second meetings of a Division increased 50 to 100 per cent over their first meetings, an indication that National Divisional Meetings are sound. The Local Sections, where these meetings have been held, have given them wholehearted support, and the Executive Committees of the Divisions have given time and energy and paid their own traveling expenses to attend and develop them.

The other three activities noted in the accompanying table show equal improvement over last year.

As to activities for the coming year, the Standing Committee finds that it is faced with the need of supporting eleven or twelve National Meetings. It is impossible for the Committee to grant the funds necessary to carry out this program, as an additional appropriation of about $3000 over the present budget would be necessary. Five more Division Meetings will be held during the remaining months of the calendar year: Two in October, Machine Shop Practice cooperating with the American Gear Manufacturers, Buffalo; Textile, Greenville, S. C.; three in November:

PROFESSIONAL DIVISION ACTIVITIES IN 1928[1]

FOUR-POINT PROGRAM

	Aeronautic	Applied Mechanics	Fuels	Hydraulic	Iron and Steel	Machine Shop Practice	Management	Materials Handling	National Defense	Oil and Gas Power	Petroleum	Power	Printing Industries	Railroad	Textile	Wood Industries	Total 1928	Total 1927
1 *Sessions at Society Meetings* (Semi-Annual, Regional, Annual)																		
a Number of sessions	4	5	3	3	3	4	5	4	0	1	1	7	1	4	1	1	47	39
b Number of papers	7	11	5	7	4	11	9	6	0	2	3	14	3	11	1	3	97	72
2 *National Division Meetings*	2	0	1	0	1	1	0	1	1	1	0	0	0	0	2	0	10	8
a Number of sessions	8	0	14	0	1	3	0	6	0	6	0	0	0	0	4	0	42	31
b Number of papers and addresses	23	0	30	0	2	8	0	14	0	10	0	0	0	0	6	0	93	71
c Attendance—members	200	0	400	0	420	210	0	250	0[2]	200	0	0	0[3]	0	135	0[3]	1815	1590
d Attendance—non-members	250	0	263	0	384	150	0	175	0	150	0	0	0	0	140	0	1512	1280
e Attendance—Total	450	0	663	0	804	360	0	425	0	350	0	0	0	0	275	0	3327	2870
1 & 2																		
a Total Division Sessions Held	12	5	17	3	3	7	5	10	0	7	1	7	1	4	5	1	88	58
b Total Division Papers Presented	30	11	34	7	5	19	9	20	0	12	3	14	3	11	0	3	181	143
3 *Research*																		
a Survey Committee at Work	0	0	1	1	0	1	1	1	0	1	0	0	1	1	1	0	9	9
b Executive Committee Acting as Survey	1	1	0	0	0	0	0	0	1	0	1	1	0	0	0	1	6	5
c Number of Projects Suggested	1	2	0	0	0	2	2	2	0	2	0	0	0	0	0	0	11	20
d Number of Special Research Committees at Work	0	0	1	0	0	0	2	2	0	2	0	0	0	0	1	3	11	7
4 *Progress Reports*	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	14	13
5 *Enrollment in Divisions—1928*	1990	3249	3422	1740	2129	3791	6032	2544	*	2805	1121	3606	241	1131	590	655	34,974	
6 *Enrollment in Divisions—1927*	1241	2200	2716	1219	1318	2783	4133	1750	*	1980	784	4264	165	823	374	447		26,197

[1] Record of National Meetings is from November 1, 1927, to November 1, 1928.

[2] National Defense Division cooperated with Army Ordnance Association at Aberdeen, October 4, 1928, and it was impossible to estimate A.S.M.E. attendance. Total attendance of 6000 was for a number of cooperating organizations.

[3] Printing Industries Division and Wood Industries Division are holding their meetings this year in November, too late to be included in total.

* All members of the Society are now enrolled in National Defense Division.

Printing Industries, Rochester; Iron and Steel, Chicago; Wood Industries, Grand Rapids.

The approximate expense for financing National Meetings is as follows:

For a one-day meeting, $250 to $350
For a two-day meeting, $450 to $650
For a 3- or 4-day meeting, $750 to $1000.

These sums do not include traveling expenses either for the staff or for any of the Executive Committee of the Division. The amounts cover only the following items:

Printing and circularizing of program
Preprinting of technical papers
Reporting of technical sessions
Miscellaneous expenses for registration, lantern and special correspondence.

The Professional Divisions have given further proof this year of the wisdom of the four-point program. During the coming year the program will be continued with limitations necessary to keep within the present budget.

Local Sections

The year 1927-1928 has stressed some outstanding developments in the history of the Local Sections movement. The Susquehanna Section was organized with headquarters at York, Pa., and territory including Harrisburg and Lancaster. This brings the total number of Sections to 69. The organization was completed in time for the new Section to be represented at the 1927 Annual Meeting. The territory of the Lehigh Valley Section was enlarged to include the region to the north, thereby providing for the entire northeastern section of Pennsylvania. The transaction included the changing of the name to the Anthracite-Lehigh Valley Section. An arrangement is provided whereby eight meetings will be held annually by the enlarged Section, one in each of the principal cities in the territory it covers.

In all, 391 meetings of Local Sections were held, this being an increase of thirteen per cent of the number held the previous year.

The outstanding accomplishment of the year was the acceptance by the Council at the Pittsburgh meeting of the proposal to base the appropriation for Local Sections upon a total equivalent to twenty per cent of the total amount annually paid into the Society's treasury as dues. Such a sum will enable all Sections to function within the individual allotments made them in accordance with the formula published in the "Manual for the Operation of a Local Section." The Council has thereby once more given its approval to the Local Sections movement. No greater compliment could be accorded the excellent results which most of the Local Sections are producing.

The Council at its meeting in Boston, October 1, 1928, approved the following resolution:

Resolved: That it is the policy of the Standing Committee on Local Sections not to recommend to the Council, as provided in Article R11, Rule 1, the formation of a Local Section for members residing outside of North America, Hawaii, Porto Rico and Cuba, but in lieu thereof the Local Sections Committee recommends the fostering of group activity of members of the Four National Engineering Societies residing outside of the territory named above, and approves the principle of giving such groups *nominal* financial support, provided that such group action is not in con-

LOCAL SECTIONS VISITED BY MEMBERS OF LOCAL SECTIONS COMMITTEE, 1927-1928

Section	J. D. Cunningham	Paul Doty	T. L. Wilkinson	H. R. Westcott	C. W. Bennett	E. Hartford, Secy.
Akron	—	—	—	—	—	Apr. 1927
Atlanta	Mar. 1928	—	—	Mar. 1928	—	Mar. 1927
Baltimore	—	—	—	—	—	Sept. 1927
Birmingham	Mar. 1928	—	—	Feb. 1927	—	Feb. 1927
Bridgeport	—	—	—	—	—	Sept. 1928
Buffalo	—	—	—	—	—	Apr. 1927
Charlotte	—	Mar. 1928	—	—	—	Mar. 1928
Chattanooga [1]	Mar. 1927	—	—	—	—	—
Cleveland	—	—	—	—	—	Apr. 1927
Dayton	—	—	—	—	—	Oct. 1927
Detroit [1]	Sept. 1927	Sept. 1927	—	Sept. 1927	—	Sept. 1927
Erie	—	—	—	—	—	Mar. 1927
Houston	—	—	—	Mar. 1927	—	Mar. 1927
Kansas City	—	Mar. 1927	—	—	—	—
Knoxville [1]	Mar. 1927	Mar. 1928	—	—	—	—
Lehigh Valley	—	—	—	—	—	Oct. 1927
Memphis [1]	Mar. 1927	—	—	—	—	—
Metropolitan	Dec. 1927 (A.M.)	Dec. 1927	—	Dec. 1927	Dec. 1927	Permanent
Mid-Continent	—	Mar. 1927	—	—	—	Mar. 1927
Nebraska	—	Mar. 1927	—	—	—	—
New Britain	—	—	—	May 1928	—	—
New Orleans	—	—	—	Mar. 1927	—	Mar. 1927
North Texas	Mar. 1927	Mar. 1927	—	Mar. 1927	—	Mar. 1927
Philadelphia	—	—	—	—	—	Apr. 1928
Pittsburgh [2]	—	—	—	—	—	—
Plainfield	—	—	—	—	—	Dec. 1927
Raleigh	—	Mar. 1928	—	—	—	Mar. 1928
Rochester	—	—	—	—	—	Apr. 1927
Rock River Valley	—	—	—	—	—	Feb. 1928
St. Louis	—	—	—	Mar. 1927	—	Oct. 1927
St. Paul	Aug. 1928	Aug. 1928	Aug. 1928	Aug. 1928	Aug. 1928	Aug. 1928
Savannah	Mar. 1928	Mar. 1928	—	Mar. 1928	Mar. 1928	Mar. 1928
Susquehanna	—	—	—	—	—	Nov. 1927
Tri-Cities	—	—	—	—	—	Feb. 1928
Western Wash.	—	Aug. 1927	—	—	—	—
Western Mass.	—	—	—	Jan. 1928	—	—

[1] This Section visited by William A. Hanley.

[2] Visited by entire committee, May, 1928.

flict with the policy and activities of any established national engineering society in foreign countries, and that such groups cooperate with such foreign societies.

The Local Sections continue their support of the Professional Divisions and during the year National Divisional Meetings were held as follows:

St. Louis, *Fuels,* Oct. 10-13, 1927
Grand Rapids, *Wood Industries,* Oct. 17-18, 1927
Rochester, *Management,* Oct. 26-27, 1927
Youngstown, *Iron and Steel,* Nov. 10, 1927
Philadelphia, *Materials Handling,* Apr. 23-24, 1928
Boston, *Textile,* May 22, 1928
State College, *Oil and Gas Power,* June 14-16, 1928
Detroit, *Aeronautic,* June 28-29, 1928
Cincinnati, *Machine Shop Practice,* Sept. 24-27, 1928
Cleveland, *Fuels,* Sept. 17-20, 1928
Wichita, *Aeronautic,* Sept. 21-22, 1928

In addition to these a Summer Meeting that had many of the attributes of a Spring Meeting was held at Minneapolis-St. Paul. In connection with this meeting a Great Lakes tour was sponsored which encouraged the attendance of a large number of members in the East.

A number of Local Sections were added to the group of those already taking a definite interest in the welfare of the Student Branches in their respective territories. Student Branches not only were encouraged to attend meetings of the Local Sections but a decided number of Sections planned a meeting definitely for the purpose of bringing the students and membership of the Section together. Meetings of this type were arranged by the Metropolitan Section with its ten Student Branches; Kansas City Section with University of Kansas; Western Washington Section, University of Washington; New Haven Section, Yale University; Colorado Section, Colorado Agricultural College; Utah Section, University of Utah; Anthracite-Lehigh Valley Section, Lafayette College; Atlanta Section, Georgia Tech; Greenville Section, Clemson College; Florida Section, University of Florida; San Francisco Section, Stanford University, University of California, and University of Santa Clara; Oregon Section, Oregon State Agricultural College, Pittsburgh Section, Engineering Society Western Pennsylvania, Carnegie Tech, and University of Pittsburgh; Tri-Cities Section, Davenport Engineers Club, University of Iowa; Columbus Section, Ohio State University. The Indianapolis Section sponsored a debate between students of Purdue University and Rose Polytechnic Institute. The Oregon and Metropolitan Sections also offered prizes for the best student papers.

The usual Conferences of Local Sections Delegates were held at the Annual and Spring Meetings. At the former sixty-seven delegates were present and at the latter twenty-five Sections were represented.

Functioning as the Committee on Society Development which also is part of its field, the Committee on Local Sections was responsible during the year for a considerable increase in the income of the Society both in the matter of initiation fees and dues. It has issued publication announcements of activities of the Society which are distributed to those interested in obtaining membership.

As in the previous year, the Committee's efforts were more in the direction of increased efficiency in existing Local Sections than in the further extension of the number of Sections. With that aim before them, members of the Committee have visited many Sections, as shown in detail in the accompanying table.

Constitution and By-Laws

The Committee on Constitution and By-Laws acts as a reviewing committee and advisor to the Council in preparing the wording of revisions to the Constitution, By-Laws and Rules.

The revisions for the past year were only minor changes in the By-Laws and Rules to cover present policies. They relate to subscription prices for the new Transactions (Professional Divisions' Quarterlies), Rules adjusting headquarters' office hours to correspond with those of other societies in the Engineering Societies Building; By-Laws covering authority and duties of the Executive Committee of Council and the Finance Committee on investments; also revised billing procedure for dues.

Rules to care for foreign groups of members, as approved in policy by the Council, were also completed.

With the advice of the Society's attorney, the Committee has reviewed the amended Membership Corporation laws of the State of New York, under which the Society holds its Charter, and has found that the revised laws require no changes in the A.S.M.E. procedure, nor have they any bearing or limitation upon the present or future policies which may be determined by the Council.

Awards

In addition to meetings held during the year, the Committee on Awards was called upon to devote a great deal of time to the reading of papers submitted for the various Society awards.

The Committee recommended to the Council the following awards:

(1) One Student Award to Clarence C. Franck, recently graduated from Johns Hopkins, for his paper, "Conditions Curves and Reheat Factors for Steam Turbines." This paper has been accepted by the Publications Committee for publication in the Society Transactions.

(2) The Junior Award to M. D. Aisenstein of the Byron Jackson Pump Manufacturing Co., of Berkeley, California, for his paper, "A New Method of Separating the Hydraulic Losses in a Centrifugal Pump."

(3) The Charles T. Main Award to Robert M. Meyer of Newark College of Engineering for his paper, "Scientific Management and Its Effect on Manufacturing."

(4) That no medal be given for the Melville Award for the year 1927.

(5) That the A.S.M.E. Medal be awarded to Julian Kennedy "for his services and contributions to the iron and steel industry."

(6) That the Holley Medal Award be given at the Fiftieth Anniversary of the Society in 1930.

The subject for the Charles T. Main Award for the year 1928-1929 to be sent to the Student Branches is "The Influence of Engineering on Farm Production."

A report of the Max Toltz Loan Fund is made as part of the Finance Committee's report. To date, loans totaling $2,565 have been made to 19 students.

It has been urged that closer restrictions as to age, references, and education for student contestants for the awards be written into the Rules. Heretofore the only restriction has been that the contestant should be either an undergraduate or graduate student pursuing a course toward a degree. The Council has requested the Awards Committee to present their recommendations for these revisions.

Relations with Colleges

During the year, the ninety-third Student Branch of the Society was established at the Speed Scientific School of the University of Louisville, Louisville, Ky.

The total number of meetings reported by the Student Branches for the year was 586, which is an increase of practically forty per cent over last year. This number includes thirteen meetings held in conjunction with other engineering societies in the same colleges, and seventeen meetings in which both the Student Branch and the Local Section in the vicinity cooperated. Both the Metropolitan and the Oregon Sections awarded cash prizes for the best student papers. The Indianapolis Section sponsored a debate between the Rose Polytechnic Institute and the Purdue University Student Branches. As these facts indicate, the Local Sections have taken a greater interest than heretofore in the development of the Student Branches, the objective in all cases being to make the undergraduate feel that the Society has a definite interest in his progress.

Student Branch Conferences have been held at the Annual, Spring and Regional Meetings, and the usual luncheon with Council, at which President Dow spoke, was held last December.

The Committee on Relations with Colleges has been investigating carefully the need for a publication for undergraduate mechanical engineers. The Committee has also encouraged the issuance of a monthly mimeographed Bulletin to the officers and Honorary Chairmen of the Student Branches, and the composition of a "Manual for the Operation of a Student Branch." The latter has been issued in mimeographed form to the officers and Honorary Chairmen of the Student Branches and will later be printed. Suggestions have gone out regularly with information regarding speakers, motion-picture films available, etc.

The Committee has made a definite effort to visit a larger number of Student Branches. Messrs. Church, Potter, Libby, and Hartford made visits to the following Student Branches: Bucknell University, Carnegie Institute of Technology, Catholic University of America, University of Cincinnati, Drexel Institute, George Washington University, Iowa State College, University of Iowa, University of Kentucky, University of Louisville, University of Michigan, Ohio Northern University, Ohio State University, Penn State College, University of Pennsylvania, University of Pittsburgh, Pratt Institute, Princeton University, Rutgers University, University of Santa Clara, Villanova College, Virginia Polytechnic Institute, University of Virginia, Washington University, and West Virginia University.

The number of the national officers of the Society or members in general who have interested themselves in Student Branches is comparatively small, and the Committee wishes to ask all those who have the inclination to do anything for this very worthy purpose to write to the Committee volunteering their services. The Committee expresses its appreciation of the generous cooperation of those members who have contributed to Student Branch activities, and especially to the faculty members who have given extensively of their time as Honorary Chairmen.

Education and Training for the Industries

Meetings of the committee were held in New York in December, 1927, and in Pittsburgh in May, 1928. There is an active correspondence, however, in which all members of the committee share.

Perhaps the most important investigation within the field the committee is supposed to cover is the study being made by Dr. Wm. E. Wickenden and his staff, of engineering education of the non-college type. This is, probably, the most authoritative investigation in this field ever undertaken, and will cost about $30,000, the money being provided by the Carnegie Foundation and a number of educational institutions of the country. The committee has been in touch with Dr. Wickenden for some years, and several of the committee members are on an advisory committee in connection with this study, which is being conducted under the auspices of the Society for the Promotion of Engineering Education.

The first public statement of the work done so far in this study of engineering education of non-college type will be presented on December 4 at a session of the 1928 A.S.M.E. Annual Meeting on education and training for the industries, to be held under the joint auspices of the Society for the Promotion of Engineering Education and the A.S.M.E. Committee on Education and Training for the Industries in the auditorium of the Engineering Societies Building. This meeting will be presided over by Dean Dexter S. Kimball, President of the S.P.E.E. and Past-President of the A.S.M.E. The Committee on Education and Training hopes to provide a forum for the presentation of various aspects of this study of engineering education of non-college type, so far as this is consistent with the idea of cooperating with the S.P.E.E.

This committee has arranged or been largely instrumental in arranging the following sessions on education and training for the industries during the past year. The papers marked with an asterisk have appeared in *Mechanical Engineering.*

Annual Meeting, New York, December, 1927

Chairman: D. C. Jackson, Member of Committee on Education and Training for the Industries.

*"Apprentice Training for Draftsmen," by C. J. Freund, Apprentice Supervisor, The Falk Corporation, Milwaukee, Wis.

*"Principles of Apprenticeship Organization," by Ben. S. Moffat, Supervisor of Apprentice Training, Caterpillar Tractor Co., San Leandro, Calif.

Spring Meeting, Pittsburgh, May, 1928

Chairman: R. L. Sackett, Member of Committee on Education and Training for the Industries.

"Training Minor Executives in a Rapidly Growing Organization," by A. J. Beatty, Director of Training, The American Rolling Mill Co., Middletown, Ohio.

Summer Meeting, St. Paul-Minneapolis, August, 1928

Chairman: S. Carl Shipley, Professor of Machine Construction, University of Minnesota, Minneapolis, Minn.

"The Apprenticeship Training Program of the Tri-City Manufacturers," by S. M. Brah, Apprentice Supervisor, The Tri-City Manufacturers' Association, Moline, Ill.

"Does Mass Production Lessen the Need for Trade Skill," by H. A. Frommelt.

New England Industries Meeting, Boston, October, 1928

Chairman: Howard Coonley, President, the Walworth Manufacturing Co., Boston, Mass.

"Apprentice System of Lynn Plant, General Electric Company," by Charles K. Tripp, Supervisor of Apprentices, General Electric Co., Lynn, Mass.

"Experience in the Selection of Apprentices with the Aid of Tests," by Walter S. Berry, Director of Training, The Scovill Manufacturing Co., Waterbury, Conn.

For the coming year, the Committee's plans are to assist Dr. Wickenden and his staff by offering their sessions in various parts of the country as a forum in which to release, when available, definite material relating to education for industry.

The committee will continue to present papers on apprenticeship training. There come to the committee each year a number of papers which arise spontaneously and are referred to them for action. Out of these they usually find a number that are timely and appropriate.

The suggested investigation of education and training for industry, mentioned in the Committee's report of October 27, 1927, is being held up because of the fact that the present study by Dr. Wickenden of engineering education of non-college type covers a certain section of this field, and the development of methods by Dr. Wickenden's staff will be of the greatest importance in planning the more comprehensive study. The field of education for industry for mechanical lines is wide, and it was found difficult to make a general plan of study of this field that would be generally acceptable.

Library

The Engineering Societies Library has been active throughout the year in supplying information, translations, and copies of articles to members of the Founder Societies and the engineering profession generally. Approximately 35,000 persons used it during the year, about two-thirds of whom visited it, while the remainder, about 11,000, were helped by correspondence or by loans of books.

The collection now comprises 114,000 volumes and 5,000 maps. Additions are being made at the rate of 5,000 volumes annually. The current magazines number 1,200. They form the source of the Engineering Index Service of the Society, which is thus relieved of the task of collecting and caring for a special file.

The Budget for 1928 is $65,208, of which amount $37,000 was appropriated by the Founder Societies, and $18,908 is to be earned by the Service Bureau. The remainder is provided by the United Engineering Society from endowment and other sources.

The library is continuing to develop the service feature of its work, the making of searches and digests, and also the loaning of books by mail.

On the first of July, 1928, the Founder Societies adopted a new method for library appropriations. This method distributes the expense between them on the basis of membership, instead of the former distribution in equal shares. The new method allocates the expenses more equitably according to the use of the Library.

At the end of its fiscal year, December 31, 1928, the Library will publish a report which will be sent to any member on request.

Research

The research activities of the Society have continued in a healthy and growing state throughout the past year. In the following paragraphs will be found a brief summary of the year's work as well as a more detailed review of each special and joint research committee's activities for the year.

COMMITTEE DEVELOPMENT

The Main Research Committee, which is in charge of the Society's research activities, has held four meetings during the year. Each of the 20 Special and Joint Research Committees now organized has held on an average two meetings in the same period. At the 1928 Annual Meeting five of these Special Committees, namely, Fluid Meters, Lubrication, Mechanical Springs, Boiler-Feedwater Studies and Steam Tables, will conduct open sessions at which reports and papers dealing with the activities of each will be presented for discussion.

Five new research committees were authorized by the Council during the year, on the subjects of management, strength of cylindrical and semispherical vessels under external pressure, Diesel fuel-oil specifications, properties and life of wire rope, and absorption of radiant heat in boiler furnaces. As a result of the activities of the Fluid Meters Committee a cooperating committee was organized in Germany during the summer by the Verein deutscher Ingenieure to carry on experimental work on certain phases of the American Committee's program. Several new projects are in prospect from the Research Survey Committees of the A.S.M.E. Professional Divisions, notably from the Machine Shop Practice, Textile, Hydraulic, Printing Industries, and Aeronautic Divisions.

During the year $37,000 has been contributed by industry and others to the support of certain of the special and joint research committees. This makes a total of $173,000 raised by the Special and Joint Research Committees of the Society since 1920.

RESEARCH PROMOTION

Throughout the year the Main Committee has given particular attention to the activities of the Research Survey Committees of the Professional Divisions and has assisted them in formulating and carrying forward their programs. The functions of these committees is to survey the field covered by their Divisions for needed research, to crystallize such needs, where advisable, into definite research projects, and to recommend these projects to the Main Research Committee for conduct under the research procedure of the Society.

Two large conferences held during the year between the chairman and secretaries of the Special and Joint Research Committees and the Research Survey Committees of the Professional Divisions contributed a great deal to a better understanding of the related functions and activities of each group. The standing Committee on Local Sections has also become interested in the possibility of establishing research survey committees in certain of the Local Sections in large industrial communities.

The Main Research Committee recognizes as one of its useful functions the exchange of research information with engineering colleges and the rendering of such assistance as it can to the development of research men in these colleges. Toward this end a list of suggested problems suitable for student-theses research was sent out in the early Spring to the engineering colleges of the country through the Honorary Chairmen of the Society's 92 Student Branches. These met with very hearty response and it is hoped that closer contacts between the colleges and the Main Research Committee will result.

Research committee publications for the year filled approximately 110 pages of *Mechanical Engineering* and Sections of Transactions. These publications comprised special- and joint-committee reports and articles of a general research nature sponsored by the Main Committee. A bibliography of some 365 references, carefully annotated and indexed, on the "Effect of Temperature on the Properties of Metals" prepared by the A.S.M.E.-A.S.T.M. Joint Research Committee of that name was published during the year by the Society. Another bibliography of 600 completely annotated and indexed references on the subject of "Mechanical Springs" was published for the Mechanical Springs Committee by the Society.

News items on A.S.M.E. research have been released twice a month to the *A.S.M.E. News* and the technical press during the past year and have given effective publicity to the Society's research activities, judging from the inquiries they have prompted. Over 3,000 copies of the Main Committee's booklet entitled "Research Activities," which outlines in a comprehensive manner the organization and accomplishments of the Society's research activities, have been distributed to domestic and foreign technical societies and associations, A.S.M.E. technical committees, and in large number throughout industry in connection with the financial campaigns of the Special and Joint Research Committees. These booklets have contributed a great deal to a better understanding and increased support of the Society's research activities among technical and business men both here and abroad.

The Main Committee is maintaining contact with foreign research work through organizations such as the Verein deutscher Ingenieure in Germany, the British Institution of Mechanical Engineers, and the Department of Scientific and Industrial Research in Great Britain. In the case of A.S.M.E. committees, whose work has a counterpart abroad, close contact is maintained by these committees through exchange of correspondence and research reports.

Brief Committee Reports

A review of progress made during the past year by each of the Special and Joint Research Committees of the Society follows:

Lubrication. Mayo D. Hersey, chairman. Authorized in October, 1915, to investigate the fundamental problems of lubrication phenomena, to formulate the results of investigations previously made, and to keep in touch with contemporary research in this field.

Mr. Hersey was elected chairman last December on the resignation of Albert Kingsbury.

During the past year the Committee's experimental program has gone forward. At the Bureau of Standards under Mr. Hersey the effect of variations in the length-diameter and clearance-diameter ratios on journal-bearing friction have been studied and will be reported at the Lubrication Session of the 1928 Annual Meeting. At Pennsylvania State College, Professor Bradford has been conducting experiments to test the theory of lubrication. The Research Department of the Westinghouse Electric and Manufacturing Co. has been cooperating with the Committee in a study of large-bearing characteristics. At the Lubrication Session Mr. Howarth will give a paper on journal-running positions.

Engineering Foundation provided $500 during the year to assist the committee in developing a financial campaign.

The publications of this committee during 1927-1928 were:

"Viscosity of Lubricants under Pressure," Mayo D. Hersey, preprinted for 1927 Annual Meeting.

"The Effect of Running In on Journal-Bearing Performance," S. A. McKee. *Mechanical Engineering,* December, 1927.

"An Investigation of the Performance of Waste-Packed Armature Bearings," G. B. Karelitz. Applied Mechanics Section of Transactions, January-April, 1928.

"Progress in Lubrication Research," A report of the Special Research Committee on Lubrication. *Mechanical Engineering,* September, 1928.

"Journal Running Positions," H. A. S. Howarth, to be presented at Lubrication Session of 1928 Annual Meeting.

"Friction of Journal Bearings as Influenced by Clearance and Length," by S. A. McKee and T. R. McKee, to be presented at Lubrication Session of 1928 Annual Meeting.

Fluid Meters. R. J. S. Pigott, chairman. Authorized in 1916 to develop the theory of fluid meters of all kinds and to report on the best methods of their application.

The activities of this Committee have been carried on during the past year by seven Sub-Committees in developing the remaining sections of the Fluid Meter Report, namely, Part 2 on Description of Meters, and Part 3 on Influence of Installation. Through the efforts of Jacob M. Spitzglass, Secretary of the Committee, who has been in Germany for the past year, the Verein deutscher Ingenieure has organized a research committee which will cooperate with the American committee in the revision of the dimensional analysis section of the Fluid Meter Report, Part 1.

The Committee has arranged for a Fluid Meters Session at the 1928 Annual Meeting at which papers by John L. Hodgson, of English flow-measurement fame, and Prof. R. W. Angus, of the University of Toronto, will be presented, as well as progress reports of the Fluid Meters Sub-Committees.

The publication of this committee during 1927-1928 was:

"Report on Fluid Meters, Part 1" (Second Edition), issued November, 1927.

Properties of Steam and the Extension of Steam Tables. G. A. Orrok, chairman. Authorized in December, 1921, to direct research on the accurate determination of constants for the upper limits of the steam tables and to check the existing tables in the regions of lower pressures.

The sixth annual session of the Committee, held at the time of the 1927 Annual Meeting, was largely attended. A report of the Executive Committee and progress reports of the Committee's research were presented. A similar session will be held at the 1928 Annual Meeting.

The experimental work which this Committee has been conducting on a large scale over the past few years is now drawing to a close. The work at the Bureau of Standards still continues. It is not expected, however, that the data will be available in the form of the A.S.M.E. Steam Tables for some time. Approximately $72,000 has been collected from industry to date.

The publication of this committee during 1927-1928 was:

"Progress in Steam Research," Reports of work at Bureau of Standards, Massachusetts Institute of Technology, Harvard University, and General Electric Company. *Mechanical Engineering,* February, 1928.

Strength of Gear Teeth. Wilfred Lewis, chairman. Authorized in 1921 to conduct tests for the determination of the effect of varying degrees of tooth accuracy and varying velocities on the strength of gear teeth.

Prof. Earle Buckingham, who has been directing the experimental work of this Committee at the Massachusetts Institute of Technology, has recently completed an extensive mathematical analysis of data obtained from tests previously made on the Lewis gear-testing machine. This study has been reproduced in a series of 12 progress reports which have appeared regularly during the past year in *Mechanical Engineering.* Professor Buckingham is now conducting a series of experimental tests on the Lewis testing machine which has been so altered as to check the accuracy of the data previously secured. Entirely new conceptions of gear-tooth action are foreshadowed as the result of this Committee's work. Approximately $6,000 has been spent by the Committee since its beginning.

The publications of this Committee during 1927-1928 were:

"Influence of Elasticity on Gear Tooth Loads" (Progress Reports Nos. 8-12)

"Tests on Non-Metallic Gears," Progress Report No. 13.

Cutting of Metals. W. W. Nichols, chairman. Authorized in 1923 to investigate and report on the needs of the machine-tool industry in the matter of improved design and to correlate the activities of the various organizations, firms, and individuals which are now at work in this field.

Mr. Nichols, vice-president, D. P. Brown and Co., Detroit, Mich., was elected chairman in December, 1927, on the resignation of Prof. James A. Hall. The Committee is at present engaged in raising funds to finance the collection and correlation of existing data on the cutting of metals.

At the 1928 Annual Meeting the Sub-Committee on Cutting Fluids will present a preliminary report on its program of correlating performance characteristics of cutting liquids with their physical and chemical properties and thereby developing purchasing specifications. At the same time another sub-committee will present for approval a tentative test code on tool steels.

During the year the Sub-Committee on Machinability has been carrying on machinability tests and cooperating with an A.S.S.T. committee on the development of recommended practice sheets covering machinability, confined particularly to commercial practice.

Engineering Foundation granted $500 this year to this Sub-Committee for preliminary expenses in connection with the development of its program.

The publication of this Committee during 1927-1928 was:

"Progress Report of Sub-Committee on Cutting Fluids," to be presented at Lubrication Session of 1928 Annual Meeting.

Mechanical Springs. Joseph Kaye Wood, chairman. Authorized in 1923 to determine the present status of the mechanical-spring art, to promote and conduct necessary and adequate research, and to develop the art to the point of standardization.

About a year ago the Special Research Committee on Mechanical Springs employed a research associate at Union College, Schenectady, N. Y., on experimental work leading to the development of a reliable code of design for mechanical springs. An extensive report of this work will be given at a Technical Session of the 1928 Annual Meeting.

As a result of personal calls made by various members of the Committee, on manufacturers and users of springs, a comprehensive research program on mechanical springs has been framed, based directly on the needs of industry. The Bell Telephone Laboratories, the U. S. Naval Experiment Station at Annapolis, Md., and other commercial laboratories are cooperating in carrying on certain experimental phases of the Committee's research program covering materials, fatigue, etc. Approximately $6,000 has been collected by this Committee to date.

The publications of the Committee during 1927-1928 were:

"Tests on Belleville Springs by the Ordnance Department, U. S. Army," by D. A. Gurney (October 3, 1928)

"Bibliography on Mechanical Springs," 75 pages. 600 references completely annotated and indexed.

Progress Reports Nos. 1, 2, and 3.

Elevator Safeties. M. H. Christopherson, chairman. Authorized in June, 1924, to study the function and operation of elevator safeties, buffers, and their associated mechanisms and to develop methods of test for the approval of elevator safety devices.

The extensive equipment for testing elevator safeties and associated devices that the Committee's research fellows have been developing during the past two years at the Bureau of Standards is now completed. The installation includes a six-story elevator shaft with elevator and special instruments for recording test data on elevator safeties, the whole having cost approximately $32,000, including installation charges and salaries of the research associates. The latter are now studying various types of buffers and elevator safeties for the purpose of developing satisfactory approval tests for the A.E.S.C. Safety Code for Elevators.

In addition to its research function, the Committee undertakes to interpret the Safety Code for Elevators to all inquirers and is assisting also in the formulation of an inspector's handbook. The funds collected to date total $52,000.

Effect of Temperature on the Properties of Metals. G. W. Saathoff, chairman. Authorized in December, 1924, as a Joint Research Committee with the American Society for Testing Materials to encourage investigation and accumulate data on the properties of metals used in the mechanic arts at extremely high and low temperatures.

The Committee's elaborate series of long- and short-time tests on a variety of metals are being continued through the cooperation of some twenty industrial and Government laboratories. Due to the nature of these tests and inasmuch as they must be fitted into the routine schedule of these concerns, results will necessarily be somewhat slow in developing.

Negotiations are now being completed with the University of Illinois preparatory to a program of fatigue tests on metals at high temperatures which will be conducted by Prof. H. F. Moore. $1,700 has been collected by the Committee to support this work.

A large amount of service data on alloys at high temperature has been collected by the Committee from industry. Publication of this data in tabulated form is under consideration.

The publication of this Committee during 1927-1928 was:

"Bibliography on Effect of Temperature on the Properties of Metals," of 350 references completely annotated and indexed, 32 pages.

Boiler-Feedwater Studies. S. T. Powell, chairman. Authorized in March, 1925, to study methods of analysis and treatment of boiler feedwater for stationary and railroad practice and to undertake needed research. Committee jointly sponsored by the A.B.M.A., A.R.E.A., A.W.W.A., N.E.L.A., A.S.T.M., and the A.S.M.E.

A program for the development of a report on the present state of knowledge on foaming and priming has been formulated.

Much time has been spent by the Executive Committee during the past year in raising a fund for the proposed research program. No active work is planned on this program until the entire fund of $300,000 has been pledged for the five-year study.

The Committee directs attention again this year to the great losses occurring in the operation of steam generating stations which results from contaminated water supplies due to stream pollution by industrial waste.

Through the work of Sub-Committee No. 8 tentative standard methods of analyses applicable to power-plant use have been proposed. Some of these methods are now being tested in a number of central-station laboratories. Five sub-committees of the Joint Research Committee on Boiler-Feedwater Studies are to present progress reports of their past year's work at the 1928 Annual Meeting.

Throughout the year technical papers have been presented before the various groups interested in these problems. These papers have been submitted as contributions to the work of the Committees. Some 250 abstracts of the technical literature of the world pertaining to boiler-feedwater treatment and allied problems have been supplied the Committee by the A.C.S. Chemical Abstracts and the A.S.M.E. Engineering Index Service.

The publications of this Committee during 1927-1928 were:

"Progress Reports of the Joint Research Committee on Boiler Feedwater Studies." Fuels and Steam Power Section of Transactions, May-August, 1928.

Papers contributed at meetings of other societies.

Condenser Tubes. Prof. A. E. White, chairman. Authorized in May, 1925, to report on the causes of failure of cooper-alloy tubes in heat-interchange apparatus in which steam and water are handled.

The Committee is at present investigating the relation of condenser-operating characteristics to tube failures. Through the means of a widely circulated questionnaire to public utilities, street-railway companies, etc., the geographical locations of condenser-tube failures in this country have been determined. With this information as a basis the Committee has obtained the cooperation of several of these concerns in collecting additional information which it is hoped will reveal the effect, if any, of condenser-water turbulence, and consequently condenser design on tube deterioration.

The publications of this Committee during 1927-1928 were:

"Geographical Location of Bad Condenser-Water Conditions" (Progress Report No. 1 of the A.S.M.E. Special Research Committee on Condenser Tubes). *Mechanical Engineering*, February, 1928.

"A.S.M.E. Special Research Committee on Condenser Tubes" (Contemplated Work of the Sub-Committee on Questionnaire). *Mechanical Engineering*, May, 1928.

Boiler-Furnace Refractories. C. F. Hirshfeld, chairman. Authorized in June, 1925, to determine the principal factors governing the failure of refractories in various types of installations, to subject these factors to detailed experimental analysis, to undertake the formulation of suitability tests, and, if necessary, to attempt to develop a suitable refractory to meet the needs of severe service.

The field investigations that have been carried on by the Committee's two research fellows, R. A. Sherman and Edmund Taylor, during the past four years have been completed. These studies were conducted in some forty central stations throughout the United States to determine the principal factors governing the failure of refractories under various service conditions. Progress reports have appeared regularly in *Mechanical Engineering*.

The laboratory phase of the Committee's program is progressing at the University of Illinois and the Ceramic Laboratory of the Bureau of Standards at Columbus, Ohio. The purpose of this work is to formulate, on the basis of the field-investigation data, specifications for use of existing types of refractories and to attempt the development of improved types that will meet the severe service conditions of present practice. An investigation into the viscosity-temperature reactions of coal-ash slags is also in progress at the University of Illinois.

To date $26,000 has been collected by this Committee from industry for support of its work.

The publications of this Committee during 1927-1928 were:

"Refractories Service Conditions in a Furnace Burning Pittsburgh Coal on Underfeed Stokers," by R. A. Sherman and W. E. Rice. *Mechanical Engineering,* October, 1927.

"Refractories Service Conditions in Furnaces Burning Powdered Illinois Coal with Long-Flame Burners," by R. A. Sherman and E. Taylor. *Mechanical Engineering,* August, 1928.

Welding of Pressure Vessels. E. H. Ewertz, chairman. Authorized in June, 1926, as a joint committee with the American Bureau of Welding, to develop an acceptable fabrication procedure and test specifications for welded unfired pressure vessels.

With the cooperation of the A.S.M.E. Boiler Code Committee a proposed test program on welded pressure vessels, to be conducted at the U. S. Bureau of Standards, has been laid out and the support of tank manufacturers and users solicited. Half of the $30,000 required for the investigational work has already been pledged. The results of these tests will be used by the A.S.M.E. Boiler Code Committee in considering the revision of its Unfired Pressure-Vessel Code.

Worm Gears. Prof. Earle Buckingham, chairman. Authorized in September, 1926, to investigate certain problems in connection with the action of worm drives and recommend improvements in their design, manufacture, and use.

A large amount of service and test data on the efficiencies, load-carrying abilities, and lubrication conditions of worm drives has been collected from manufacturers and users of these drives and has been analyzed by the Committee's worm-contact method. Two reports have been formulated, one containing over one hundred drawings illustrating the method of analysis, while the other gives the results of applying the analysis to actual test and service data.

The publications of this Committee during 1927-1928 were:

"Geometrical Analysis of Worm Contact," by Earle Buckingham (First Progress Report of Committee).

"Second Progress Report of the Special Research Committee on Worm Gears," to appear in an early issue of *Mechanical Engineering.*

Saws and Knives. C. M. Bigelow, chairman. Authorized in September, 1926, to make a study of the uses of the various types of saws and knives employed in the lumbering and woodworking industry with the purpose of recommending improvements in their design, manufacture, and use.

As the result of information collected by members of the Committee on the present-day types and uses of saws and knives in the lumbering and woodworking industries, a report was prepared and presented for discussion at the recent New England Industries Meeting of the Society in Boston, October 3, 1928. This report reveals the need for research leading toward simplification and standardization, and outlines a general program of research procedure. Considerable interest and assurance of cooperation in the Committee's plans have already been indicated by both manufacturers and users of those tools.

The publication of this Committee during 1927-1928 was:

"Reducing Waste by Improvement of Design and Use of Woodworking Saws and Knives," Progress Report No. 1 of the A.S.M.E. Special Research Committee on Saws and Knives. To be published in an early issue of the Wood Industries Section of Transactions.

Existing Supplies of Hardwoods. Authorized in September, 1926, to study the needs of the woodworking industries for hardwoods and to determine the availability and possible application of tropical species to the requirements of these industries.

Through the cooperation of the Tropical Plant Research Foundation, the Pack Forest Trust, and the Forestry Service of British Guiana, representative samples of tropical woods are being collected in British Guiana for the Committee. These samples will be brought to New York where they will be sawed up into test lengths and shipped to the Forestry Department of the University of Michigan. Here tests will be made to determine the applicability of these woods to the uses of the wood industries in this country and will be followed by practical factory tests. Some fifty wood-using concerns throughout the country have supplied information on their wood requirements to aid the formulation of these tests.

The publications of this Committee during 1927-1928 were:

"Bibliography on Woods of the World" with Special Emphasis on Tropical Woods, 74 pages. Completely annotated and indexed.

"American Markets for Tropical Timbers," by H. M. Curran, preprinted from *Mechanical Engineering.*

"The Need of Research on Tropical Woods before Marketing," by Arthur Koehler. Wood Industries Section of Transactions, May-August, 1928.

"Our Need for Knowledge of Tropical Timbers," by Samuel J. Record. Wood Industries Section of Transactions, May-August, 1928.

Spark Arresters. Authorized in September, 1926, to study the need for further development of various fire-protective devices used on steam-generating apparatus in forest areas.

Surveys have been conducted during the past two years for the Main Research Committee to determine the relation between forest fires and the use of spark arresters on railroad and logging locomotives, donkeys engines, and sawmills in forest areas. These surveys were made by special investigators in the three great logging regions of the country, namely, the Northwest, the Middle North, and the South, through the Local Sections and Student Branches in each district, and final reports have been presented.

From the reports on these surveys it appears that the need is for more careful use and maintenance of existing spark-arresting devices rather than for improved design. These reports have been summarized in a single paper which will be widely distributed throughout the country, during the coming year.

The publication of this Committee during 1927-1928 was:

"Steam Generating Apparatus in Forest Areas as Related to Causes of Forest Fires," by A. C. Coonradt. Paper summarizing three reports.

Cutting Edges. Authorized in December, 1926, to make a study of the use of thin metal plates for cutting edges with the purpose of recommending improvements in design and manufacture. So far interest in this project has not been sufficient to justify the organization of a committee.

Absorption of Radiant Heat in Boiler Furnaces. Prof. W. J. Wohlenberg, chairman. Committee of engineers from large public-utility and combustion-equipment manufacturing concerns appointed in April, 1928, to make a study of this phenomenon and develop useful design data.

The Committee is at present engaged in correlating and analyzing existing information on the subject which will be used as the basis of its future program.

Velocity Measurement of Fluid Flow. Dr. W. F. Durand, chairman. Authorized in September, 1927, to develop an absolute method for determining the velocity of the flow of fluids by means of the location of nodal points in wave systems.

The experimental work is being carried on at the University of Minnesota by Professors H. E. Hartig and H. B. Wilcox. Engineering Foundation has contributed for this year the sum of five hundred dollars, with the understanding that if the reports show satisfactory progress the same amount will be contributed for each of the two succeeding years.

Fuels. F. R. Wadleigh, chairman. Authorized in October, 1927, to collect existing data on Fuels Research, coordinate present research efforts where possible and advisable, and carry on research on specific problems in this field.

The entire field of fuels research is of interest to the Committee, including coal, oil, gas, etc. However, the first step in the program has consisted in establishing contact with all possible sources of information, such as trade and technical periodicals, associations, universities, industries, and individuals both in this country and abroad. A very complete response has been received and a report is now being prepared on fuels research either in progress or very much needed. The Committee's activities must necessarily be of a cooperative nature with other fuels research groups as well as the manufacturing and using interests.

The publication of this Committee during 1927-1928 was:

"The Need for Coal Research," by F. R. Wadleigh, presented at Second National Meeting, A.S.M.E. Fuels Division, Cleveland, Ohio, Sept. 17-20, 1928, to appear in an early issue of Fuels and Steam Power Section of Transactions.

Physical Constants of Refrigerants. Authorized in October, 1927, as a joint committee with the A.S.R.E. to carry on research leading to the determination of the physical constants of certain refrigerants.

Preliminary study of the problem has indicated that a large-scale program is advisable, support by the Government and technical organizations in this field. Accordingly the cooperation of the American Society of Refrigerating Engineers, the American Institute of Refrigeration, the Refrigerating Machinery Association, and The American Society of Mechanical Engineers has been secured in making a joint appeal to Congress for support of a $50,000 a year research program at the U. S. Bureau of Standards. It is estimated that with this fund the constants of three or four important refrigerants could be obtained at the same time and that additional fundamental data of great value would be provided.

Strength of Cylindrical Vessels under Pressure. Authorized in October, 1927, to develop reliable design data on the strength of cylindrical and semi-spherical surfaces under external pressure, particularly with reference to jacketed vessels.

The problem has been amplified as follows: (1) Computation of strength of inner and outer shells of a jacketed cylinder with staybolts between shells; (2) computation of strength of inner shell of jacketed cylinder when there are no staybolts; (3) computation of strength of cylindrical structures similar to Scotch boiler furnaces for same general construction as stated in Items 1 and 2.

A large number of manufacturers and users of jacketed kettles, digesters, enamelled tanks, vacuum stills, etc., have indicated interest in this project. A committee is to be organized shortly to study the problem.

Management. W. E. Freeland, chairman. Authorized in May, 1928, to attempt the reconciliation of certain economic laws affecting production and to develop formulas for general adoption.

A mathematical study of the following laws forms the basis for the Committee's work: (a) Economic expenditures for equipment, (b) economic size of manufacturing lots, (c) minimum-cost point in continuous manufacture, (d) economic size of purchase lots, and (e) economic percentage of spoilage.

Because of the nature of the problem the committee expects to carry on its studies over a long period of time. Considerable assistance may be expected from the cooperation of the American Management Association.

Diesel-Fuel-Oil Specifications. Authorized October 1, 1928, to investigate the possibility of establishing uniform specifications for oil intended for use as Diesel-engine fuel.

The proposed investigation will consist essentially in the correlation of existing information on the subject and the conduct of necessary tests. The American Petroleum Institute and the Diesel Engine Society have assured the committee of their support. The Committee personnel is practically complete.

Wire Rope. Authorized October 1, 1928, as an investigation of the properties of wire rope and of the factors governing the life of wire rope in service.

This is a problem of broad interest and it is apparent that a large-scale experimental program will be necessary. A committee representing the principal wire-rope manufacturers and users in this country is now being formed to head up the program. It will have the sponsorship and substantial support of Engineering Foundation.

Standardization

The year's progress in the development of dimensional and quality standards for commodities falling within the scope of the Sectional Committees sponsored by the A.S.M.E. has been gratifying, and indicates an increasing desire on the part of both producer and consumer interests to take advantage of the benefits to be derived from such cooperation.

The A.S.M.E. is now sponsor or joint sponsor for 25 sectional committees, under the procedure of The American Engineering Standards Committee. These Sectional Committees have been subdivided into 129 sub-committees and sub-groups in order that the work of standardization may be expeditiously prosecuted. A majority of these committees have worked steadily during the past year, and many of them have completed the tasks assigned them. Brief summaries of this progress follow.

Publicity. The committee has supplied the technical and daily press throughout the year with a considerable amount of material relative to the standards which have been developed by the Sectional Committees sponsored by this Society. In addition it has caused to be published in *Mechanical Engineering* approximately 33 pages of text during the same period. Articles of general and timely interest have been run also in each issue of the *A.S.M.E. News.*

Personnel. On October 1, 1928, 154 committees were at work on the A.S.M.E. Standardization program. The personnel of these committees is composed of 657 members of which 295 are also members of the Society.

Published Standards. During the twelve months ending October 1, 1928, the Society published in pamphlet form seven standards which had passed completely through the A.E.S.C. procedure. These are "150-lb. Malleable-Iron Screwed Fittings"; "125- and 250-lb. Cast-Iron Screwed Fittings"; "Mathematical Symbols"; "125-lb. Cast-Iron Pipe Flanges and Flanged Fittings"; "250-lb. Cast-Iron Flanges and Flanged Fittings"; "Plow Bolts"; and "Tinners', Coopers' and Belt Rivets." In addition to these seven the "Scheme for the Identification of Piping Systems" was presented to the A.E.S.C. for approval in July, 1928, and the proposals for "Aeronautical and Letter Symbols for Electrical Quantities" are in the hands of the sponsor societies for approval and submission to the A.E.S.C. for approval and designation as American Standards.

Transmission Chains and Sprockets. F. V. Hetzel, chairman. Since the proposals now being developed by the Sub-Committees have not reached the stage for distribution for general criticism and comment, there has been no activity of the Sectional Committee during the past year.

Sub-Committee No. 1 on Roller Chains. G. M. Bartlett, chairman. This committee held a meeting on April 18, 1928, to consider the revision and further development of their proposal. The committee will meet again in Buffalo on October 11, to continue this discussion and to develop a definite proposal.

Sub-Committee No. 2 on Silent Chains. G. A. Young, chairman. A tentative draft of a proposed standard has been developed and mimeographed copies distributed to the chain manufacturers for further study.

Shafting. C. M. Chapman, chairman. The fifth standard developed by this Sectional Committee entitled "Code for the Design of Transmission Shafting" was approved by the sponsors and the A.E.S.C. in November, 1927. Communications have been received during the year from the A.G.M.A. and the A.P.I. requesting the extension of the size range of standard shafting diameters. These are now being considered by the Committee, together with certain additions to the standards for key stock sizes.

Sub-Committee No. 5 on Woodruff Keys. L. C. Morrow, chairman. The Sub-Committee has approved Table No. 1 covering "Woodruff Key Dimensions," and copies of this Table have been submitted to members of the Sectional Committee for discussion prior to approval by letter ballot. Tables 2 and 3 on "Woodruff Keyway Dimensions," and "Woodruff Keyway Cutters," respectively, are still in the hands of the Sub-Committee.

Plain Limit Gages. E. C. Peck, chairman. The revised reports of Sub-Committees No. 2 on "Methods of Gaging" and No. 3 on "Specifications for Plain Limit Gages" which were distributed in May, 1927, have been held without action, pending the results of the work of the American Gage Design Committee.

Ball Bearings. W. R. Strickland, chairman. Meetings of this Sectional Committee were held on March 12 and April 24 in connection with the meetings of the Ball and Roller Bearing Division of the Society of Automotive Engineers. Several changes in the proposed standard for "Annular Ball Bearings and the Metric Thrust Ball Bearings" were made. The Committee is now developing shaft shoulder dimensions, and width tolerances on individual rings. A proposed American Standard entitled Nomenclature for Ball Bearings" was submitted to the committee for comment on August 1, 1928.

Elevators. Basset Jones, chairman. The future work of this Sectional Committee awaits the report of the A.S.M.E. Research Committee on "Elevator Safeties and Other Devices."

Gears. B. F. Waterman, chairman. This has not been a year of marked activity on the part of this Sectional Committee. However, at least three of the sub-committees have been at work and have produced material for distribution and discussion.

Sub-Committee on Nomenclature. E. W. Miller, chairman. The Committee has delayed revising the report which it tentatively submitted some time ago in order to take advantage of the developments of a similar committee within the A.G.M.A. which proposed to supplement its letter symbols with definitions and suitable illustrations. It is anticipated that the work will be completed during the ensuing year.

Sub-Committee on Spur Gear Tooth Form. H. J. Eberhardt, chairman. During the past year proposals for "14½-deg. and 20-deg. Full-Depth Involute Gear Tooth Forms" were developed. The report has been set in type and copies distributed for criticism prior to discussion at a meeting of the Sectional Committee.

Sub-Committee on Bevel Gears. F. E. McMullen, chairman. A draft of a proposed American Standard for "Differential Gears" was prepared for the consideration of the Sub-Committee.

Sub-Committee on Materials. T. D. Lynch, chairman. The proposed standard "Specifications for Forged and Rolled Carbon Steel" for gears was approved by the Sub-Committee and distributed widely to interested persons and the technical press previous to submission to the Sectional Committee for approval by letter ballot, as a "Recommended American Practice." The preparation of a set of standard specifications for alloy steel for gears is also being undertaken by this committee.

No reports have been made by Sub-Committee No. 5 on Helical Gears, J. J. Boax, chairman; No. 6 on Worm Gears, W. A. Hines, chairman; No. 9 on Inspection of Gears, G. L. Markland, chairman; and No. 10 on Horsepower Rating, Wilfred Lewis, chairman.

Standardization and Unification of Screw Threads. L. D. Burlingame, chairman. The Sectional Committee which was hurriedly organized in June, 1921, is now undergoing reorganization for the consideration of the revised report of the National Screw Thread Commission and several recommended standards projects. A reorganization meeting of this committee will be held early in the ensuing year.

Pipe Flanges and Fittings. C. P. Bliss, chairman. The American Standards for the following named products were completed and approved during the months mentioned; "Malleable-Iron Screwed Fittings," December, 1927; "Cast-Iron Screwed Fittings," December, 1927; and "125- and 250-lb. Cast-Iron Pipe Flanges and Flanged Fittings," February, 1928. These standards have been published in pamphlet form by the A.S.M.E.

Sub-Committee No. 1 on Cast-Iron Pipe Flanges and Flanged Fittings. A. M. Houser, chairman. The proposed standard for "800-lb. Hydraulic Cast-Iron Pipe Flanges and Flanged Fittings" has been approved by the Sub-Committee and is now awaiting discussion at a meeting of the Sectional Committee prior to submission to them for approval by letter ballot.

The 25-Lb. Standard Cast-Iron Pipe Flanges and Flanged Fittings was approved by the Sectional Committee. In deference, however, to the Sub-Committee on Gas and Air Piping of the Sectional Committee on a Code for Pressure Piping this proposal is being withheld from submission to the sponsors until satisfactory adjustments can be made.

Sub-Committee No. 2 on Screwed Fittings. S. G. Flagg, Jr., chairman. The proposed standard for "Long-Turn Sprinkler Fittings" was approved in May, 1928, by letter ballot of the Sectional Committee. This standard is now in the hands of the sponsor organizations.

Sub-Committee No. 3 on Steel Pipe Flanges and Flanged Fittings. C. P. Bliss, chairman. The tentative American Standard for "250-, 400-, 600-, 900-, and 1350-Lb. Steel Pipe Flanges and Flanged Fittings" is to be supplemented by dimensions for flanges and fittings having a 150-lb. pressure rating. The proposed dimensions for this standard have been distributed for criticism prior to discussion at the meeting of the Sectional Committee.

Van Stone and Screwed Companion Flanges. J. R. Tanner, chairman. During the year the data obtained by the tests of steel flanges was analyzed by Prof. E. O. Waters, of Yale University, and a formula developed. This formula was found to give dimensions which correspond very closely with results obtained in practice. A set of standard dimensions for companion flanges has been computed by the aid of the formula and the graphical chart prepared by J. H. Taylor for the complete range of pressures. This proposal is now in the hands of the Sub-Committee. A meeting of the sub-committee will therefore be held within a few weeks for the consideration of suggested modifications.

Sub-Committee No. 5 on Face-to-Face Dimensions of Ferrous Flanged Valves. F. H. Morehead, chairman. At the request of the American Engineering Standards Committee, the Sectional Committee on the Standardization of Pipe Flanges and Fittings appointed a Sub-Committee to undertake the standardization of face-to-face dimensions of ferrous flanged valves for W.S.P. of 125- and 250-lb. per square inch. This newly organized Sub-Committee is now collecting data and preparing a proposal for submission to the Sectional Committee and the industry for criticism.

Sub-Committee No. 6 on Malleable Iron or Steel Brass Seat Unions for Minimum Steam Pressures of 300 Lb. The recommendation of the Heating and Piping Contractors National Association and the A.S.M.E. to the American Engineering Standards Committee that the standardization of malleable iron or steel brass seat unions for minimum steam pressures of 300 lb. be undertaken under the scope of the Sectional Committee on the Standardization of Pipe Flanges and Fittings, has been approved and a sub-committee has been appointed.

Bolt, Nut, and Rivet Proportions. A. E. Norton, chairman. The proposed American Standard for the following three items receive approval by the A.E.S.C. on the dates given: "Round Unslotted Head Bolts," February, 1928; "Plow Bolts," April, 1928; and "Tinners', Coopers' and Belt Rivets," May, 1928.

Sub-Committee No. 1 on Large and Small Rivets. H. N. Wallin, chairman. Having completed the standards for "Small Rivets" and "Tinners', Coopers' and Belt Rivets" this Sub-Committee turned its attention more actively to the completion of a proposal on "Large Rivets." This proposed standard is now being duplicated in printer's proof form for distribution to the members of the Sectional Committee, the technical press, and a selected list for criticism and comment.

Sub-Committee No. 3 on Slotted Head Proportions. E. W. Reed, chairman. After several revisions a proposed American Standard was agreed upon by the Sub-Committee and submitted to the technical press and interested persons for criticism in July, 1928, prior to submission to the Sectional Committee for approval by letter ballot. The letter ballot indicates that the proposal is not entirely acceptable in its present form and that a meeting of the Sectional Committee will be necessary before final approval can be had.

Sub-Committee No. 4 on Track Bolts and Nuts. C. W. Squier, chairman. This Committee is cooperating closely with the Rail Committee of the American Railway Association in the development of standards for (a) "Elliptic-Neck Track Bolts" and (b) "Oval-Neck Track Bolts." There is now complete agreement on the dimensions of the first-named proposed standard, but some of the large manufacturers take exception to certain dimensions of the latter.

Lack of authoritative information regarding the physical characteristics of track bolts and nuts has greatly delayed the development of an acceptable proposal. The Engineering Division of the American Railway Aassociation has assisted the Committee by testing various types and sizes. With these test data the Sub-Committee is working out the dimensions of a new head for oval-head track bolts. It is expected that its revised proposal will be submitted to the Sectional Committee for approval within a short time.

Scheme for the Identification of Piping Systems. A. S. Hebble, chairman. The pamphlet outlining the proposed "Scheme for the Identification of Piping Systems" was approved by the Sectional Committee in the early part of the year but slight editorial changes were made by the Editing Committee before it was submitted to the sponsor organizations. Upon the receipt of their approval it was transmitted in July, 1928, to the A.E.S.C.

Small Tools and Machine Tool Elements. H. E. Harris, chairman. One meeting of the Sectional Committee has been held during the past year to consider the reports of the Technical Committees. Its personnel now consists of twenty representatives of the three sponsor organizations. In order to expedite the work of the Sectional Committee it has been found advisable to form an Executive Committee of five members of the Sectional Committee. The standardization of six new projects has been undertaken by Technical Committees Nos.: 6, Designations and Working Ranges of Machine Tools; 7, Drill Sizes; 8, Drill Bushings; 9, Punch and Die Holders; 10, Circular Forming Tools and Holders; 11, Chucks and Chuck Jaws; 12, Cut and Ground Taps.

These technical committees are now being formed through the activity of Mr. Harris and the Executive Committee.

Technical Committee No. 2 on Tool-Holder Shanks and Tool-Post Openings. P. M. Mueller, chairman. After giving due consideration to the criticisms advanced by the sponsor bodies and various small-tool groups, the proposal was revised and submitted to the Sectional Committee for approval by letter ballot. The results of this ballot have not as yet been summarized, owing to the difficulty of completing the poll.

Technical Committee No. 3 on Machine Tapers. E. F. DuBrul, chairman. Three meetings of the Committee have been held during the past year. The replies received to the questionnaire which was sent to approximately 600 manufacturers throughout the country have indicated that industry favored the use of a single standard taper. Since a single taper series is desired, the Committee is now confining its efforts to determining the most acceptable angle for this taper and the other important dimensions of the complete series. A special sub-group has been appointed to further discuss this subject and to develop a proposal for submission to the Technical Committee at its next meeting.

Technical Committee No. 4 on Spindle Noses and Collets. While the project was included with T-slots, tool holders, and machine tapers as the four original projects undertaken by the Committee, little progress toward the organization of the Technical Committee was made until this year.

Technical Committee No. 5 on Milling Cutters. C. W. Machon, chairman. The Sub-Group on Nomenclature developed its proposal, copies of which were widely distributed to the members of the Technical Committee, the technical press, and a selected list for criticism. The Sub-Group is now considering the replies received.

The Sub-Group on Profile Cutters has developed a proposal which has been set in type and copies distributed to the members of the Technical Committee prior to a discussion at a regularly called meeting.

Scientific and Engineering Symbols and Abbreviations. J. F. Meyer, chairman. Seven of the sub-committees organized under this Sectional Committee have been very active during the year. The American Standard for "Mathematical Symbols," the report of Sub-Committee No. 6, was approved by the A.E.S.C. in January, 1928. The standard is now printed in pamphlet form. Edward V. Huntington is chairman of this Sub-Committee.

Sub-Committee No. 2 on Symbols for Hydraulics. G. E. Russell, chairman. This Sub-Committee completed its proposal in February, 1928. Since then it has been approved by the Sectional Committee and is now before the sponsor societies for approval and submission to the A.E.S.C.

Sub-Committee No. 3 on Symbols for Heat and Thermodynamics. Dr. S. A. Moss, chairman. This Sub-Committee expects to hold a meeting in the near future to discuss and ratify certain developments in its report which resulted from general distribution for criticism and comment.

Sub-Committee No. 5 on Aeronautical Symbols. J. S. Ames, chairman. The proposed standard on "Aeronautical Symbols" was approved by the Sectional Committee and is now before the Sponsors for approval prior to submittal to the A.E.S.C.

Sub-Committee No. 7 on Electrotechnical Symbols. J. F. Meyer, chairman. A proposed tentative standard on "Electrotechnical Symbols" has been approved by the Sectional Committee and copies submitted to the Sponsors for approval.

Sub-Committee No. 9 on Abbreviations for Engineering and Scientific Terms. G. A. Stetson, chairman. The tentative report was completed during the summer months and it is now being set in type preparatory to distribution to the members of the Sectional Committee, the technical press, and a selected list of interested individuals for criticism and comment prior to the submission to the Sectional Committee for approval by letter ballot.

Plain and Lock Washers. C. W. Squier, temporary chairman. During the Spring Meeting of the A.S.M.E. in Pittsburgh, May, 1928, the members of the Sectional Committee on Plain and Lock Washers met and organized two Sub-Committees to undertake the standardization of Plain Washers and Lock Washers. A third Sub-Committee on Cast- and Malleable-Iron Washers was considered but not organized due to lack of information regarding the needs of industry in this connection. It is anticipated that considerable progress will be made by these sub-committees during the ensuing year.

Machine Pins. M. E. Steczynski, chairman. This Sectional Committtee has been inactive during the greater part of the past year due to the lack of adequate organization. Since the office of Chairman has been filled a tentative draft of a proposal for an American Standard on "Taper Pins" has been prepared for submission to the members of the Committee for criticism and comment.

Drawings and Drafting Room Practice. F. DeR. Furman, temporary chairman. While no meetings of the Sectional Committee were held during the year, its members have been at work developing the reports of the several Sub-Committees.

Sub-Committee on Layout. F. G. Wolf, chairman. In January, a proposal recommending the use of the third angle of projection as standard practice was broadly distributed for criticism and comment. This proposal was received with general favor.

Sub-Committee on Line Work. S. Ketchum, chairman. This Sub-Committee has been particularly active this year. It has held two meetings and has carried on a lively correspondence between its members. As a result a definite proposal for certain standard practices in line work on drawings will go out shortly for criticism and comment.

Sub-Committee on Lettering. T. G. Crawford, chairman. In October, 1927, this Committee mailed a carefully proposed questionnaire to 900 interested firms and individuals. On the basis of the replies to this inquiry, a definite proposal is now being prepared.

Pressure Piping. E. B. Ricketts, chairman. During the past year two meetings of the Sectional Committee have been held for consideration of the reports of the Sub-Committees which are developing the various sections of the code. The sections on Power Piping, Gas and Air Piping, Oil Piping, Piping Materials and Fabrication Details are well along toward completion.

Graphic Presentation. E. F. DuBrul, chairman. During the year the six Sub-Committees have been active in collecting materials for their proposals. Sub-Committee No. 2 on Terminology, of which M. B. Lane is chairman, has completed a draft of its proposal on "Statistical Presentation" and this has been distributed generally for criticism and comment.

Pipe Threads. The obvious need for a revision of the pamphlet describing the "American Standard for Pipe Threads" which was printed in 1919 prompted the reorganization of the Sectional Committee in December, 1927. At that time the personnel was developed into a representative group of producers, consumers and general interests and six sub-committees were appointed to undertake the standardization of (a) Straight Pipe Threads, (b) Taper Pipe Threads, (c) Plumbers' Threads, (d) Screw Threads for Rigid Electrical Conduits, (e) Special Threads for Thin Tubes, and (f) Editing and Gaging. These sub-committees are collecting data and preparing proposals for submission to the Sectional Committee. The Sub-Committee on Screw Threads for Rigid Electrical Conduit held a meeting in Pittsburgh in May, 1928.

Wire and Sheet-Metal Gaging Systems. The S.A.E. and the A.S.M.E. accepted the invitation of the American Engineering Standards Committee for joint sponsorship for the standardization of Wire and Sheet-Metal Gaging Systems. A large number of national organizations have been invited to appoint official representatives to this Sectional Committee, and plans for the organization meeting are nearly completed.

Plumbing Equipment. This year the Society accepted joint sponsorship with the American Society of Sanitary Engineering for the Standardization of Plumbing Equipment. Following the necessary conferences between representatives of the sponsor societies invitations were sent to 32 national organizations requesting appointments to this Sectional Committee. The organization meeting was held on November 2, 1928.

Wrought-Iron and Wrought-Steel Pipe and Tubing. The Sectional Committee which was sponsored by the A.S.T.M. and the A.S.M.E. held its organization meeting in Pittsburgh during the Spring Meeting of the Society. At that time sub-committees were formed to undertake the standardization of Pipe and Tubing for Low-Temperature Service; Pipe and Tubing for High-Temperature Service; Materials; and Plan and Scope. On June 29 the Sub-Committee on Plan and Scope met in Atlantic City to review the personnel and outline the work of each Sub-Committee.

Electric-Motor Frame Dimensions. The invitations extended to the A.S.M.E. and the N.E.M.A., by the American Engineering Standards Committee to accept joint sponsorship for the standardization of electric-motor frame dimensions were accepted. The sponsors have since formed a Sectional Committee representing 20 national organizations. The Committee held its organization meeting on March 2, 1928, and is now awaiting the development of a draft of tentative dimensions to be considered for use without reference to the motor rating.

Speeds of Driven Machines. During the past year the Society accepted the invitation of the American Engineering Standards Committee and became sole sponsor for the standardization of the Speeds of Driven Machines. Accordingly, in May, 1928, invitations were extended to 52 national organizations requesting the appointment of an official representative to serve on this Sectional Committee, the organization meeting of which was held on October 18, 1928.

Small-Hose Couplings. Following the general conference on this project held on March 19, 1928, the A.S.M.E. accepted the invitation of the A.E.S.C. for sole sponsorship for the standardization of Small-Hose Couplings Screw Threads. Accordingly invitations have been sent to 36 national organizations requesting appointments to the Sectional Committee. The organization meeting was held on October 26, 1928.

Power Test Codes

Seventeen of the twenty-four test and supplementary codes on the program of the Committee on Power Test Codes are now in final pamphlet form. During the period from 1922 to 1927, inclusive, the following fifteen (15) codes were issued in pamphlet form:

Code on General Instructions
Code on Definitions and Values
Test Code for Solid Fuels
Test Code for Stationary Steam Boilers
Test Code for Reciprocating Steam Engines
Test Code for Reciprocating Steam-Driven Displacement Pumps
Test Code for Displacement Compressors and Blowers
Test Code for Condensing Apparatus
Test Code for Feedwater Heaters
Test Code for Refrigerating Systems

Test Code for Evaporating Apparatus
Test Code for Steam Locomotives
Test Code for Internal-Combustion Engines
Test Code for Hydraulic Power Plants and Their Equipment
Test Code for Speed-Responsive Governors

This year, 1927-1928, two additional tests codes as well as one part of Instruments and Apparatus appeared in pamphlet form:

Test Code for Steam Turbines
Test Code for Centrifugal and Rotary Pumps
Part 1, General Considerations, Instruments and Apparatus.

The first printings of the following twelve codes, which have been published in pamphlet form, were exhausted during the past three years, and have been reprinted in quantity to supply the demand. In some cases they were considerably revised:

Code on General Instructions
Code on Definitions and Values
Test Code for Stationary Steam Boilers
Test Code for Reciprocating Steam Engines
Test Code for Reciprocating Steam-Driven Displacement Pumps
Test Code for Displacement Compressors and Blowers
Test Code for Feedwater Heaters
Test Code for Condensing Apparatus
Test Code for Refrigerating Systems
Test Code for Evaporating Apparatus
Test Code for Internal-Combustion Engines
Test Code for Hydraulic Power Plants and Their Equipment

The second printings of the following codes were exhausted during the present year, so they are being revised by their respective committees before further reprinting.

Code on General Instructions
Code on Definitions and Values
Test Code for Stationary Steam Boilers

The Test Code for Water-Cooling Equipment was printed in full in the August, 1928, issue of *Mechanical Engineering.*

The Test Code for Gas Producers has passed completely through the procedure laid down by the Main Committee and has been approved and adopted by the Council as a standard practice of the Society. It will soon be available in pamphlet form.

A résumé of the progress which has been made so far in the preparation of the sections on Instruments and Apparatus is as follows:

Part 1, "General Considerations," was published in pamphlet form in June, 1928.

Part 2, "Pressure Measurement," Chapter 1, "Barometers," was published in the November, 1927, issue of *Mechanical Engineering,* and Chapter 6, "Tables, Multipliers and Standards," in the July, 1928, issue.

Part 3, "Temperature Measurement," Chapter 1, "General," has passed completely through the procedure laid down by the Main Committee and has been approved and adopted by the Council as a standard practice of the Society. Chapter 6, "Glass Thermometers," appeared in the April and May, 1926, issues, and Chapter 7, "Pressure-Gage Thermometers" in the October, 1928, issue of *Mechanical Engineering.*

Part 6, "Electrical Measurements" has been approved by Individual Committee No. 19 and will soon be published in abstract form in *Mechanical Engineering*.

Part 21, "Leakage Measurement," Chapter 1, "Condenser Leakage Tests," was published in the November, 1925, issue of *Mechanical Engineering*, and recently has been submitted to the Council for approval and adoption as a standard practice of the Society.

The twenty individual committees and the Main Committee now include in their personnel one hundred and nineteen members of the Society and thirteen non-members.

Through its representatives on the U. S. National Committee of the International Electrotechnical Commission, the Society and the Main Committee on Power Test Codes participated in the New York meeting of the I.E.C. held here in April, 1926.

The Society's representatives on the U. S. National Committee are: Fred R. Low, William F. Durand, C. Harold Berry, Francis Hodgkinson, H. Birchard Taylor, and C. B. Le Page, alternate.

Following the New York meeting of the I.E.C., the U. S. National Committee was designated as the Secretariat of the I.E.C. Advisory Committee No. 4 on Prime Movers. Accordingly, in preparation for a meeting of the Advisory Committee held at Bellagio, Lake Como, Italy, in September, 1927, the Secretariat developed a proposal which is believed would assist in unifying and accelerating the work of the I.E.C. Advisory Committee on Prime Movers. The proposal related to the establishment of a definite outline for international agreements on all the proposed test codes for prime movers. At the Bellagio meeting the document covering international agreements on the testing of hydraulic turbines was completed and accepted. Dr. William F. Durand, Past-President of the Society, attended the Bellagio meeting as one of the official delegates of the United States, and was elected to preside at the sessions of the Advisory Committee on Prime Movers.

Due to the development and expansion of the work of the Advisory Committee it was decided at the Bellagio meeting to form two distinct committees, to be known as Advisory Committee No. 4 on Hydraulic Turbines and Advisory Committee No. 5 on Steam Turbines. It was agreed also that the United States should hold the Secretariat for both of these committees. Dr. Fred R. Low, Chairman of the Main Committee on Power Test Codes, is Director of the Secretariat and C. B. Le Page, Assistant Director.

A tentative draft of Part I of an international document on the testing of steam turbines was further developed and it was agreed that another meeting of the Advisory Committee should take place prior to the next plenary meeting of the I.E.C. in 1930.

This meeting was held during the week of May 20 at The Hague, Holland, for the purpose of formulating Part II or a set of recommendations covering rules for acceptance tests for steam turbines. The American representatives were Francis Hodgkinson, Irving E. Moultrop, and Clarence M. Popp; Clifford B. Le Page attended on behalf of the Secretariat. The Secretariat is now charged with the responsibility of revising the rules formulated at The Hague meeting prior to the next meeting of the Advisory Committee.

Safety

The A.S.M.E. Safety Committee reports that the safety projects in which the Society is interested have progressed during the past year.

Safety Literature. The Committee has during the past year published in the Engineering and Industrial Standardization Section of *Mechanical Engineering* comments relating to the development of the Safety Codes for Textile, Rubber Machinery, and Refrigeration. Articles on Safety and Production, Submarine Safety and Salvage Devices, Safety in Flying, and other safety topics have appeared in the same publication.

Safety Codes. The American Engineering Standards Committee's present safety program includes 44 safety code projects. The A.S.M.E. is sponsor or joint sponsor for the six of these Sectional Committees which are listed below and has representation on 21 additional Sectional Committees. The A.S.M.E. sponsorships cover the following Codes:

Safety Code for Mechanical Power Transmission Apparatus
Safety Code for Elevators
Safety Code for Machinery for Compressing Air
Safety Code for Conveyors and Conveying Machinery
Safety Code for Cranes, Derricks and Hoists
Safety Code for Mechanical Power Control

Personnel. Up to October 1, 1928, the Sectional Committees which are formulating the safety codes listed above had organized 21 Sub-Committees and Sub-Groups which with the Main Committee make a total of 28 Committees of the Society at work on its safety program. There are 67 A.S.M.E. members and 134 non-members serving on these committees.

Safety Code for Elevators. S. W. Jones, chairman. The Sectional Committee on Safety Code for Elevators, as previously reported, published its Code in 1925. In July the committee learned that the City of Chattanooga, Tenn., was at work on an elevator safety code. Investigation developed the fact that this project was in the hands of the Chattanooga Engineers' Club with which the members of the Chattanooga Local Section of the A.S.M.E. are cooperating. Full cooperation was assured. The Sub-Committee on Research, Interpretations, and Recommendations, formed in 1926, has met regularly each month during the past year to receive and discuss inquiries relative to the application of the Code. The Sub-Committee on Operating and Inspecting Rules held a meeting in June and reported considerable progress.

Safety Code for Mechanical Power-Transmission Apparatus. C. B. Auel, chairman. The Sectional Committee on a Safety Code for Mechanical Power-Transmission Apparatus submitted a revision of its Code originally published in 1923 to the American Engineering Standards Committee in August, 1927. It was approved in November, 1927, and its status raised to that of an "American Standard." The revised reprint bears the date of November, 1927.

Safety Code for Conveyors and Conveying Machinery. C. H. Newman, chairman. The Sectional Committee on a Safety Code for Conveyors and Conveying Machinery held one meeting during the past year at which the tentative proposals of Sub-Committee No. 3 on Gravity Conveyors and Sub-Committee No. 5 on Cable Conveyors were discussed. Both reports were returned to their Sub-Committees for revision before presenting them to the Sectional Committee. The Sub-Committees on Belt Conveyors, Chain and Belt Elevators and Conveyors, Spiral and Drag or Scraper Conveyors, Cable Flight Conveyors, and Air, Steam or Liquid Conveyors are working upon their reports.

Safety Code for Cranes, Derricks and Hoists. J. C. Wheat, temporary chairman. The Sub-Committees of the Sectional Committee on a Safety Code for Cranes, Derricks and Hoists have been very active during the year. It was found advisable to combine Sub-Committees No. 3 on Derricks and No. 4 on Hoists into Sub-Committee No. 3 on Derricks and Hoists; and Sub-Committees No. 5 on Slings and Chains and Hooks and No. 6 on Wire Rope and Attachments, Sheaves and Pulleys into Sub-Committee No. 4 on Miscellaneous Equipment for Cranes and Hoists. Each of the Sub-Committees has prepared a tentative proposal for its respective section of the Code and the section dealing with Electric Traveling Cranes, prepared by Sub-Committee No. 1, is now practically completed and in the hands of the Editing Committee. The U. S. Navy Department recently requested the privilege of joint sponsorship with the A.S.M.E. for this project. This request was agreeable to the Society and is now before the A.E.S.C. for consideration.

The A.S.M.E. has representation also on the following Sectional and other Safety committees:

Safety Code Correlating Committee
Sectional Committee on Safety Code for Abrasive Wheels
Sectional Committee on Safety Code for Aeronautics
Sectional Committee on a Safety Code for Metal Mine Ventilation
Sectional Committee on Safety Code for Floor Openings, Railings and Toe Boards
Sectional Committee on Safety Code for Forging and Hot Metal Stamping
Sectional Committee on Safety Code for Industrial Sanitation
Sectional Committee on Safety Code for Lighting Factories, Mills and Other Work Places
Sectional Committee on Safety Code for Ladders
Sectional Committee on Safety Code for Laundries
Sectional Committee on Safety Code for Logging and Sawmill Machinery
Sectional Committee on Safety Code for Machine Tools
Sectional Committee on Safety Code for Mechanical Refrigeration
Sectional Committee on Safety Code for Paper and Pulp Mills
Sectional Committee on Safety Code for Power Presses
Sectional Committee on Safety Code for Rubber Machinery
Sectional Committee on Safety Code for Walkway Surfaces
Sectional Committee on Safety Code for Amusement Parks
Sectional Committee on Safety Code for Window Washing
Sectional Committee on Textile Safety Code
Sectional Committee on Ventilation Safety Code
Sectional Committee on Safety Code on Colors for the Identification of Gas-Mask Canisters
Special Committee on Low-Voltage Electrical Hazard
Committee on Underground Power Transmission and Power Equipment for Metal Mines

Professional Conduct

During the year 1927-1928, the Committee on Professional Conduct investigated a complaint against the professional conduct of a member of the Society. The case was dropped.

The Committee also gave unofficial advice on four questions of professional ethics. In one instance a report was made in *Mechanical Engineering.*

Boiler Code

The Boiler Code Committee submits the following report for the fiscal year ending September 30, 1928:

The Committee held eight regular meetings during the past fiscal year, devoted to interpretations and to the consideration of revisions and addenda upon the various sections of the Code. The meetings continue to be of great importance to the boiler and pressure-vessel industry, as with the recent remarkable development in this field many questions of a vital nature are submitted. The service rendered to the public in this manner is undoubtedly of incalculable value in guiding new departments and practice along safe lines.

The Boiler Code Committee has been very active in its cooperation with the Joint Research Committee on Welding of Pressure Vessels, to determine an advisable program for the series of tests to be conducted at the U. S. Bureau of Standards.

The Committee's attention has been called to the lack of provision in the Code to cover the joining of metals by the electric-resistance butt-welding method. Although this method may be considered the equivalent of forge welding as provided for in Par. P-186, it was felt that rules should be included in the Code, and a Special Committee was appointed whose report has been submitted and approved. The suggested rules will appear in *Mechanical Engineering* and general discussion solicited with a view of later adoption for publication in the Code.

Appointments have been made on the Sub-Committee on Welding of R. E. Cecil and S. W. Miller.

A Conferring Committee of the American Welding Society has been appointed to cooperate with the Sub-Committee on Welding of the Boiler Code Committee. The purpose of this appointment is to provide for full cooperation with the American Welding Society on problems involving welding and to enable the Boiler Code Committee better to handle the questions that are coming before it in connection with the rapidly increasing use of welding on boilers and pressure vessels.

A Committee on Welding Code for Pressure Vessels has been appointed by the American Welding Society, charged with the duty of first studying an outline of procedure for the welding of pressure vessels and then preparing it in suitable form for incorporation into the Code for Unfired Pressure Vessels. It is the hope that this procedure will enable the Code to include rules for welded construction, which if applied in accordance with this procedure will give safe results.

As a result of the publication of the Tentative American Standard for Steel Pipe Flanges and Flanged Fittings action has been taken by the Boiler Code Committee to adopt these standards for publication in the Boiler Code. This is in accordance with the promise appearing in the preamble to the last edition of the Code that the rules covering pipe flanges and fittings would be revised and others added as soon as those in process of preparation by the Committee working under the American Engineering Standards Committee were available. At the suggestion of the standardization committee, only the dimensions for the flanges will be included and all dimensions of fittings omitted. It is felt that to include the complete standards would involve unwarranted duplication of published matter of the Society, as well as a great increase in the size of the Code volume. Furthermore, it is considered that this action will be strictly logical, as the rules in the Code end at the terminating flanges of the boiler, and in the present wording of the Code, the dimensions for fittings are not mandatory.

Requests were received during the past fiscal year asking permission to publish extracts from the various sections of the Code, including a request from S. W. Thaker, Boiler Inspector of Bombay, India, to translate into the Gujarati language for use of boiler attendants in India who are not conversant with the English language, the "A.S.M.E. Suggested Rules for the Care of Power Boilers in Service."

As a result of considerable research and study which has been carried on by the Special Committee on Dished Heads, following the public hearing held in March, 1927, the present rules for dished heads have been revised to meet with present-day conditions. The revisions of these rules cover Pars. P-195 to P-198 and appared in *Mechanical Engineering*. Letters of comment have been received, necessitating further study of this problem and indicating the importance of the subject.

The Committee wishes to report that as a result of close cooperation with the Pennsylvania Department of Labor and Industry, the revised "A.S.M.E. Code for Miniature Boilers" has been adopted by that state. Slight revisions were made in the Miniature Code to meet the requirements of the State of Pennsylvania, and some important problems in miniature-boiler construction were solved.

The Committee reports that as a result of requests from manufacturers of boilers and pressure vessels, for a Code symbol stamp to be used on vessels similar to that which is used for power boilers, it has been decided, after extended conferences with the National Board of Boiler and Pressure-Vessel Inspectors, to revise the Codes so as to provide for sections stamps. These stamps are to have designating index letters, corresponding to the various sections of the Code, namely, the letter "L" on the stamp for use on boilers built in accordance with the Code for Locomotive Boilers; "M" on stamps to be used on boilers built in accordance with the Miniature Boiler Code; "U" on stamps to be used on boilers built in accordance with the Code for Unfired-Pressure Vessels, etc.

One of the most important subjects discussed by the Committee during the past year has been a proposed formula for stresses on welded joints. The proposed formula is so arranged as to combine the results of tensile and ductility tests of welded specimens and indicate directly the allowable working stress that may be safely premitted on the welded joint. This formula has been based on extensive practice with welded vessels operating under practical working conditions, and was published in *Mechanical Engineering,* with an invitation for criticism and discussion by anyone interested. The formula was also submitted to the American Welding Society for criticism. To meet the needs of the welding industry, it has been proposed to revise the "Code for Unfired Pressure Vessels" so as to incorporate the proposed formula for the purpose of rating fusion-welded joints. This revision has been drafted by the Sub-Committee on Welding and is now under consideration by the Conferring Committee of the American Welding Society.

There has been considerable demand for rules to cover the cold flanging of steel boiler plate, and accordingly a Special Committee was appointed to consider this matter as well as the question of normalizing temperatures with minimum and maximum limits. The Code has not heretofore made provision for the cold flanging of plate. These rules will be submitted in *Mechanical Engineering* for discussion with a view of adoption in the Boiler Code.

Due to the demand for the publication in one volume of the various sections of the Boiler Code, the Committee reports that the Combined Edition of the A.S.M.E. Boiler Construction Code containing Sections I to VIII was published in June, 1928. An edition of 750 copies was printed and it is understood that the new volume is meeting with much favor in the boiler industry.

The Committee reports, with regret, the death of H. V. Wille of Baldwin Locomotive Works, Philadelphia. Mr. Wille was a member of the Sub-Committees of the Boiler Code Committee on Boilers of Locomotives and on Unfired Pressure Vessels.

The Committee wishes to report their appointment of Frank H. Clark, as as a member of the Sub-Committee on Boilers of Locomotives. Mr. Clark was formerly the Chairman of this Sub-Committee, but due to his absence in China, resigned. The Committee is pleased to have him back again as a member of that Sub-Committee.

Due to the resignation of R. W. Birchfield, of the Heggie-Simplex Boiler Co., as a member of the Sub-Committee on Heating Boilers, W. A. Nevin of the same company, at the request of the Committee, was appointed to replace Mr. Birchfield.

Reports of Meetings

REPORTS OF MEETINGS

THE following pages present brief reports of meetings of the Society and of its Professional Divisions during 1928. Reference should be made to *Mechanical Engineering* and the *A.S.M.E. News* for more detailed accounts of technical sessions and entertainment features. The meetings reported here are as follows:

Meetings of the Society
- Semi-Annual, Pittsburgh, May 14-17, 1928
- Summer, St. Paul-Minneapolis, August 27-30, 1928
- New England Industries, Boston, October 1-3, 1928
- Annual, New York, December 3-7, 1928

Meetings of the Professional Divisions
- Aeronautic, Detroit, Mich., June 28-29, 1928
- Aeronautic, Wichita, Kan., September 21-22, 1928
- Fuels, Cleveland, Ohio, September 17-20, 1928
- Iron and Steel, Chicago, Ill., November 14-15, 1928
- Machine Shop Practice, Cincinnati, Ohio, September 24-27, 1928
- Materials Handling, Philadelphia, Pa., April 23-24, 1928
- Oil and Gas Power, State College, Pa., June 14-16, 1928.
- Printing Industries, Rochester, N. Y., November 8-9, 1928
- Textile, Boston, Mass., May 22, 1928
- Textile, Greenville, S. C., October 17, 1928
- Wood Industries, Grand Rapids, Mich., November 26-27, 1928

MEETINGS OF THE SOCIETY

Semi-Annual (Spring) Meeting

Pittsburgh, Pa., May 14-17, 1928

The 1928 Semi-Annual Meeting of the A.S.M.E. was held in Pittsburgh, Pa., May 14 to 17, inclusive, with headquarters at the William Penn Hotel. The program consisted of fifteen technical sessions, meetings of the Council, a conference of Local Section delegates, a Student Branch conference, a great number of committee meetings, instructive and interesting excursions to industries in and about Pittsburgh, and social events.

At the Council Meeting on Monday the budget for the coming fiscal year was adopted, and announcement was made that the 1929 Semi-Annual Meeting would be held in Salt Lake City, Utah.

While the total registration for the meeting had been exceeded by that of other Semi-Annual Meetings, the technical sessions were unusually well attended. In order that members might take advantage of the numerous excursions offered without missing the technical program, as many as four technical sessions were held simultaneously, and despite the great number of members whose presence was demanded at committee meetings, the attendance at these sessions was large and the discussions extensive and stimulating.

The total registration was 871 and comprised 477 members, 335 non-members, and 59 ladies.

Business Meeting

The Business Meeting of the Society held on Monday afternoon, May 14, was largely given over to the presentation of the Lincoln prizes, offered by J. C. Lincoln and his associates for the best papers on the subject of arc welding.

President Dow introduced Mr. Lincoln, who spoke of the technical advantages of welding as compared with riveting, and of the hesitancy with which welding, like any new process, was being adopted. The papers submitted by the contestants for the prizes had presented many examples of the superiority and economy of the arc-welding process, he said. He was particularly grateful to the committee, upon whom had fallen the arduous task of reading the seventy-seven papers offered in the contest.

L. P. Alford, chairman of the committee of judges awarding the prizes, reviewed the manner in which the papers had been considered by the committee. Eleven papers had been considered of sufficient merit to be read by all of the judges, and a unanimous vote had awarded the first prize of $10,000 to James W. Owens, of the Newport News Shipbuilding and Dry Dock Co., Newport News, Va., for his paper on "Arc Welding—Its Fundamentals and Economics."

In accepting the award, Mr. Owens took occasion to thank those who had made it possible for him to win the prize — his superiors and associates at the Newport News Shipbuilding and Dry Dock Co., the judges who had reviewed the papers, and Mr. Lincoln who had offered the prize. His winning of it, he said, placed on him a responsibility toward the development of the art.

Following Mr. Owens' acceptance of the award, C. F. Bailey, Engineering Director of the Newport News Shipbuilding and Dry Dock Company, expressed the satisfaction and pride of the company in the award of the first prize to Mr. Owens.

Mr. Alford then announced the award of the second prize of $5,000 to Prof. H. Dustin, of Brussels, Belgium, for his paper " Fundamental Principles of Arc Welding." Professor Dustin was unable to be present to accept the award in person.

The third prize of $2,500 was awarded to Commander H. E. Rossell, U. S. N., for a paper on " Electric Welding of Ships' Bulkheads and Similar Plated Structures." In the absence of the author, the award was accepted by Mr. W. T. Rossell, his brother.

The chairman then stated that the Committee had gone beyond the conditions of the contest and had accorded honorable mention to two other papers, one by Frank B. Walker, Chief Engineer of the Eastern Massachusetts Street Railway Co., Boston, Mass., entitled " Theory and Application of the Base Plate Arc-Welded Rail Joint," and the other by B. K. Smith, of the Big Three Welding and Equipment Co., Houston, Texas, entitled " Stable Arc Welding on Long-Distance Pipe Lines." In addition to these, the Committee urged the publication of three other papers submitted in the contest.

Following the presentation of the awards, a vote of thanks and appreciation was extended to the judges for their service.

The Secretary then presented by title the proposed American Standard, " Cast Iron Pipe Flanges and Flanged Fittings," and the Nominating Committee of the Society presented its nominations for officers for the coming year.

Social Events

THE SMOKER

An informal get-together was held on the first evening of the meeting. The program included music and other entertainment, a showing of Baron Shiba's aerodynamic film, and a buffet supper.

THE DINNER

The dinner on Wednesday evening was attended by about three hundred members and guests. A. N. Diehl, general chairman of the Pittsburgh meeting, presented the toastmaster of the evening, George S. Davison, past-president of the A.S.C.E. and the Engineer's Society of Western Pennsylvania.

President Dow, the first speaker, announced the award of the Holley Medal to Elmer A. Sperry for the invention and reduction to practice of the gyroscopic compass, and introduced George I. Rockwood, Worcester, Mass., who instituted and endowed the medal in 1924. After he had told of the high ideals represented in the achievements which warranted the award " for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit," the medal was displayed by the President, and presented by him to the medalist, who was received amid enthusiastic applause, the audience rising to do him honor.

Mr. Sperry expressed his gratification and appreciation of the honor done him, and spoke of the high ideals and attainments of the man for whom the medal is named, Alexander Lyman Holley, deceased founder of the Society, and known among steelmasters as the man who introduced the Bessemer process into the American steel industry. Mr. Sperry demonstrated, with the aid of a small model which he held in his hand, the principle upon which the gyroscopic compass functions, and explained that its accuracy is not affected by changes in time and location.

Other speakers were Charles M. Schwab and James Francis Burke, who spoke in place of Wm. L. Monro, unfortunately prevented by illness from being present. Mr. Schwab had recently returned from England, where he had received the Bessemer Medal, and was unexpectedly able to accept the committee's invitation to speak. He paid a graceful tribute to Mr. Davison and to Mr. Julian Kennedy (past vice-president, A.S.M.E.) who was present at the dinner, and spoke of his cherished associations with the Society. Mr. Burke extolled the greatness of Western Pennsylvania in industry, engineering, art, and literature.

The Duquesne Light Company's orchestra furnished music during the dinner and for the dancing which followed. Sir Frederick Magill, humorist, and the Red Arrow Quartette also contributed to the program.

Ladies' Program

With a headquarters of its own on the club floor of the William Penn Hotel, the sub-committee on ladies' events provided delightfully for the ladies during the four days of the meeting.

Monday afternoon was devoted to a visit to the Carnegie Museum, and the evening to a special performance given at the Little Theatre, Carnegie Institute of Technology. Tuesday, after a luncheon at the Long Vue Country Club, there was an automobile drive through some of the residential districts of the city. Of special interest was the trip on Wednesday afternoon to the plant of the H. J. Heinz Company. An informal tea bridge at the Womans City Club completed the program on Thursday afternoon.

Committee Meetings

Twenty of the Society's technical committees took advantage of the Meeting to hold sessions. These sessions were attended by over 200 persons. Seven research committees with an attendance of over 60 participated in this group of meetings. Meetings were also held by the A.S.M.E. Safety Committee, some of the Professional Divisions' committees, and several of the non-technical standing committees of the Society.

RESEARCH MEETINGS

The Main Research Committee held its regular quarterly meeting on Monday morning. Among other items of business transacted was the approval of a plan whereby the Local Sections might aid and participate in the research activities of the Society. The distribution to the engineering schools of the country by the Main Committee of a group of research suggestions for undergraduate and graduate-student thesis investigations was reported as very favorably received, and consideration given to a plan whereby substantial prizes might be established for the solution of such problems. The Main Committee also considered at this time a proposal for closer cooperation between Technical Committees and Professional Divisions through a special joint meeting held each year.

At the meeting of the Special Committee on Boiler Furnace Refractories on the same morning, R. A. Sherman and Edmund Taylor, research fellows, reported their conclusions on the field investigations which they had carried on during the past four years in some forty central stations. The laboratory phase of the committee's program in progress at the University of Illinois and the Ceramic Laboratory of the Bureau of Standards, at Columbus, Ohio, was discussed, and an investigation into the viscosity-temperature reactions of coal-ash slags planned.

On Tuesday morning representatives of the various sub-committees of the Special Committee on Fluid Meters met to discuss progress being made in completing Parts 2 and 3 of the Fluid Meter Report. Of the experimental work being conducted by this Committee the joint program arranged with a similar committee in Germany on the development of the dimensional-analysis section of the Fluid Meter Report, was of particular interest.

Two Special Committees met on Wednesday morning, that on Lubrication and that on Mechanical Springs. Plans were formulated by the former committee for a cooperative investigational program on lubrication to be carried on at the Westinghouse Elec. & Mfg. Co., Pennsylvania State College, and the Bureau of Standards. Since completing its viscosity measurements at high pressures the committee had been conducting experimental work at the Bureau on the relation between journal-bearing design and lubrication performance. The solicitation of funds to continue this work as well as extensive studies on " oiliness " phenomena was planned.

The Mechanical Springs Committee reviewed the progress of the experimental work on the development of a Code of Design being conducted by A. Hoadley, its research fellow, at Union College, Schenectady, N. Y. Announcement was made of an experimental program to be conducted for the committee by the U. S. Naval Experiment Station on fatigue and fatigue-corrosion properties of spring materials. It was also reported that the series of plant visits which had been made by various members of the committee had been very fruitful in revealing and clarifying the spring problems of industry and its live interest in this committee's work.

Twenty-five members and guests attended the luncheon meeting of the Special Committee on Cutting of Metals on Thursday. The Sub-Committee on Cutting Fluids reported progress in the analysis and correlation of data collected from industry both here and abroad on the relation between the physical and chemical characteristics of cutting fluids and their performance. It was announced that this sub-committee would also shortly undertake a series of quantitative tests on typical types of cutting oils to reveal tool-penetration quality, lubrication or oiliness, cooling, and cutting performance associated with finish. The Sub-Committee on Properties of Materials submitted a test code for high-speed turning tools for medium roughing work, to be considered for recommendation as a standard. A Sub-Committee on Bibliography and Correlation was formed, with Prof. O. W. Boston as chairman, to collect and correlate existing foreign and domestic literature on research in metal cutting. The Sub-Committee on Machinability of Metals considered the formulation of recommended practice sheets on the subject as related to commercial practice.

STANDARDIZATION MEETINGS

The A.S.M.E. Standardization Committee held its third quarterly meeting on Thursday with full attendance. The most important business of the meeting was the discussion of new standardization projects, seven of which were decided upon for presentation to the American Engineering Standards Committee.

The organization meeting of the Sectional Committee on Wrought-Iron and Wrought-Steel Pipe and Tubing was held on Friday. Prof. Collins P. Bliss, chairman of the A.S.M.E. Standardization Committee, presided. The meeting was well attended, twenty-eight men being present, and the work of the new committee started. Harold H. Morgan, District Manager, Robert W. Hunt Company, was elected temporary chairman, and Sabin Crocker, Designing Engineer, Detroit Edison Company, temporary secretary. In addition to these elections four sub-committees were designated: (1) Plan, Scope, and Editing; (2) Pipe and Tubing for Low Temperature Service; (3) Pipe and Tubing for High Temperature Service; and (4) Materials.

The Sectional Committee on Small Tools and Machine Tool Elements held a luncheon meeting preceding its regular business meeting on Tuesday. The meeting was most successful for the large number of members present and the amount of new business accomplished. The most important items were the appointment of the Executive Committee and the approval of two new projects, namely, the standardization of twist-drill sizes and of punch and die holders.

The Techincal Committee on Machine Tapers held a large meeting on Tuesday morning. Chairman DuBrul reported that the replies to the questionnaire circulated by the A.S.M.E., S.A.E., and N.M.T.B.A. indicated that a single standard taper was desirable. The suitability of existing tapers was discussed, but none could be decided upon. Several of the committee favored the complete abandonment of all existing tapers in developing the standard, while the remainder, who were a small majority, favored the retention of portions of existing taper series which have been used for a considerable length of time and found to be satisfactory. A committee of five, consisting of both theoretical and compromise proponents, was appointed to prepare a taper series for presentation at the next meeting.

The Sectional Committee on the Standardization of Plain and Lock Washers held a very active meeting on Thursday at which C. W. Squier, Associate Editor, *Electric Railway Journal,* was elected chairman, and E. R. Dowdy, Works Manager, Washer Manufacturing Company, secretary. The committee voted for two Sub-Committees, No. 1 on Plain Washers and No. 2 on Lock Washers.

The Sectional Committee on the Code for Pressure Piping held a well-attended meeting on Wednesday morning. At that time the preliminary drafts of Sub-Committee reports were discussed and recommendations made.

At the meetings of the Sub-Committees on Power Piping and Fabrication Details, the reports which were to be submitted to the Sectional Committee on a Code for Pressure Piping were discussed and revised. There was also a meeting of the Sub-Committee on Piping Materials.

Sub-Committee No. 5 on Line Work and No. 6 on Graphical Symbols of the Sectional Committee on Drawings and Drafting-Room Practice met on Tuesday and Wednesday mornings. These Sub-Committees discussed their preliminary recommendations and the Wednesday meeting terminated in a joint meeting of both Sub-Committees.

The Sub-Committee on Screw Threads for Rigid Electrical Conduit of the Sectional Committee on Pipe Threads held its first meeting on Tuesday afternoon. The session involved initiating procedure for its activity and correlating the material already presented.

The Sub-Group on Steel Companion Flanges met on Friday afternoon and discussed the proposals which were submitted for incorporation in this standard. The formulas which had been developed for flange width and thickness and which gave results agreeing very closely with those obtained by actual tests were considered and approved.

Excursions

For variety and number of places of interest to mechanical engineers, Pittsburgh is an unusual center. It would be difficult to imagine any member of the Society who would fail to find something of interest in any shop in the district. The local committee, capitalizing this wealth of interesting activity which centers about Pittsburgh, made provision for about thirty excursions. The afternoons of Tuesday, Wednesday, and Thursday were purposely set aside so that the excursions would offer no competition to the technical sessions. To the plants to which visits were made are due the warmest praise and appreciation for their cordial hospitality and the spirit of co-operation with which they assisted in making this important feature of the Meeting a success.

The major trips which received the greatest amount of attention because of their unusual interest, were the trip to the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company, and those to plants typical of Pittsburgh's most famous industries, steel and glass.

On Tuesday afternoon the excursion covered the plants of the U. S. Steel Corporation, which lie along the Monongahela River. Starting at the Homestead works, the party was carried in open gondola cars over the Union R. R., a subsidiary of the U. S. Steel Corporation, to the Clairton Works, where the trip ended. The following plants and points of interest were visited: Carrie furnaces, Central Dock, Edgar Thomson works, coal docks, Duquesne works, slag dumps and slag-preparation plant, the marine ways, and the Clairton by-product coke works.

At the Westinghouse Electric & Manufacturing Co., on Wednesday afternoon, the visitors had the opportunity of seeing the immense works founded in 1886 by George Westinghouse. The manufacturing side of a great electrical industry which varies in scope from small parts under mass-production methods to electric locomotives, generators, and transformers of large size and special design was fully illustrated.

On Thursday afternoon interest centered around the excursion to the Jeannette plant of the American Window Glass Company, the largest of the company's plants. Here were seen two of the largest glass-smelting furnaces in the world, each furnace containing 1800 tons of molten glass and producing 3240 fifty-foot boxes of window glass per day.

Technical Sessions

In addition to the sessions of the Society, members were invited to attend the Material Handling Session of the American Foundrymen's Association on Friday. The Pittsburgh Section of the American Ceramic Society met with the A.S.M.E. Management Division in the session on Management Monday afternoon. The program of the technical sessions follows:

Monday Afternoon, May 14

Fuels and Heat Flow

(Auspices of Fuels, Iron and Steel, and Power Divisions)

The Flow of Heat through Furnace Hearths, J. D. Keller.

The Use of Pulverized Coal in Basic Open-Hearth Furnaces, E. L. Herndon.

Combination Firing of Blast-Furnace Gas and Pulverized Coal, F. G. Cutler.

Management

(Auspices of Management Division and Pittsburgh Section, American Ceramic Society)

Systems of Workman Payment in Porcelain Factories, Hobart M. Kraner.

General

The Reciprocating Dry-Vacuum Pump, Walter S. Weeks and Pierre E. Letchworth.

Plate-Steel Rotor for an Electric Generator, H. G. Reist.

Education and Training for the Industries

(Auspices of Committee on Education and Training for the Industries)

Training Minor Executives in a Rapidly Growing Organization, A. J. Beatty.

Tuesday Morning, May 15

Seamless Tubing

(Auspices of Iron and Steel Division)

The Manufacture of Seamless Tubes, R. C. Stiefel and George A. Pugh.

Railroad

(Auspices of Railroad Division)

Locomotive and Freight-Car Utilization, C. B. Peck.

Power Brakes and Modern Train Operation, L. K. Sillcox.

Locomotive Sparks (*Read by title*), L. W. Wallace.

Hydraulic

(Auspices of Hydraulic Division)

A Water-Level Gage of the Long-Distance Recording Type, E. B. Strowger.

Computation of the Tail-Water Depth of the Hydraulic Jump in Sloping Flumes, Robert W. Ellms.

Wednesday Morning, May 16

Glass

(Auspices of Pittsburgh Spring Meeting Committee)

Some Recent Improvements in the Manufacture of Flat Glass, H. K. Hitchcock.

Machine Shop Practice

(Auspices of Machine Shop Practice Division)

Some Common Delusions Concerning Depreciation, Ernest F. DuBrul.

Ball-Bearing Machine-Tool Spindles, Thomas Barish.

Applied Mechanics

(Auspices of Applied Mechanics Division)

Strength of Steel Columns, H. M. Westergaard and Wm. R. Osgood.

The Theory of the Dynamic Vibration Absorber, J. Ormondroyd and J. P. Den Hartog.

Engineering Education

(Auspices of Pittsburgh Spring Meeting Committee)

Industrial Cooperation in Education, A. C. Jewett.

Education and Training as Applied to the Engineer, F. L. Bishop.

Thursday Morning, May 17

Central Station Power

(Auspices of Power Division)

Some Economic Factors in Power-Station Design, H. Boyd Brydon.

High-Pressure Steam Boilers, Geo A. Orrok.

Materials Handling

(Auspices of Materials Handling and Management Divisions)

A Materials-Handling and Transport Organization, C. A. Fike.

Applied Mechanics

(Auspices of Applied Mechanics Division)

Torsional Stress Distributions in Prismatical Bars, Lydik S. Jacobsen.

Stresses in the Drive System of Three-Cylinder Locomotives, Fritz Loewenberg.

Alloys

Mechanical Properties of Aluminum Casting Alloys at Elevated Temperatures, R. L. Templin, C. Braglio, and K. Marsh.

A Study of Tin-Base Bearing Metals, O. W. Ellis and G. B. Karelitz.

Summer Meeting

St. Paul-Minneapolis, Minn., August 27-30, 1928

St. Paul and Minneapolis cooperated with splendid results in the successful Summer Meeting of the A.S.M.E. held August 27 to 30, 1928, in these progressive cities. A well planned and happily carried-out program of excursions, sight-seeing trips, and good papers, thoroughly discussed, made this a memorable occasion. Over 300 registered, 94 members and guests coming by boat through the Great Lakes from Buffalo, stopping at Duluth for a view of the Iron Range, and visiting Winnipeg as the guests of the Engineering Institute of Canada with the Minnesota Federation of Engineers and Architects.

As this was essentially a vacation meeting, golf formed an important part of the program, and many participated in the tournament on Tuesday afternoon for which generous prizes were offered.

Council Meeting

The Council met on Monday morning with President Dow in the chair, and transacted a large volume of routine business.

Entertainment and Excursions

The excellent entertainment program opened with an informal reception to President Dow on Monday evening at the St. Paul Hotel. The Baron Shiba motion-picture film dealing with aeronautic research work carried out in Japan was shown, and music furnished by the Northern Pacific Girls' Sextet. Then the floor was cleared for dancing.

On Tuesday, the Minneapolis members provided the program. After a visit to the flour mills, the University of Minnesota, and other important industries, the party was taken to the Woodhill Country Club on Lake Minnetonka for dinner and an evening of dancing.

On Wednesday, St. Paul entertained, starting with a luncheon with the St. Paul Association of Commerce, presided over by Colonel Paul Doty, a past-president of the Association and a member of the A.S.M.E. Council. President Dow spoke of the importance of the mechanical engineer and his place in modern civilization. Then after a visit to the interesting industries of St. Paul, the party returned to the St. Paul Hotel for the banquet of the meeting, which was presided over by Conrad N. Lauer, of Philadelphia, member of the Council. The feature speakers were Thomas D. Campbell, of Hardin, Mont., and Ralph G. Budd, of St. Paul.

Both of these speakers are engineers who have made outstanding contributions to the great industries of the Northwest. Mr. Campbell, a mechanical engineer, has turned farming into an industry. His address dealt with some of the American agricultural problems. Mr. Budd, a civil engineer and president of the Great Northern Railway, discussed the situation of the railway industry since 1920 and stressed the importance of the contributions which mechanical engineers have made in this perfection period of railway development. The addresses were broadcast over KSTP. Frank Madden, St. Paul Association of Commerce, humorist, also contributed to the program. Music was furnished by the Great Northern Quartet and Songsters and the Oriental Limited Orchestra, and the evening closed with dancing.

The ladies thoroughly enjoyed the well-executed program of an able local committee. Sightseeing trips, teas, the theater, and bridge filled the time when their escorts were busy with technical matters.

Technical Sessions

The technical program was planned to deal with the mechanical problems of the industries of the Northwest. Ten good sessions resulted. They were held in the St. Paul Hotel on Monday afternoon, and on the mornings of Tuesday, Wednesday, and Thursday. A joint session with the American Society of Agricultural Engineers was held on Tuesday morning. The names of the speakers and titles of papers presented at the various sessions are given in the following summary of the technical program.

Monday Afternoon, August 27

Aeronautics

(Auspices of Aeronautic Division)

What's Coming in Aviation, W. B. Stout.

Modern Airports and Airport Planning, B. Russell Shaw.

Applied Mechanics

(Auspices of Applied Mechanics Division)

A Simplified Method of Determining Stresses in Rotating Disks (*Read by title*), M. G. Driessen.

Evaluation of the Technical Worth of a Steel from Physical Test Data, A. B. Kinzel.

Stress Analysis in Electrical Rotating Machinery, M. Stone.

Apprenticeship

(Auspices of Committee on Education and Training for the Industries)

The Apprenticeship-Training Program of the Tri-City Manufacturers, S. M. Brah.

Does Mass Production Lessen the Need for Trade Skill? H. A. Frommelt.

Tuesday Morning, August 28

Fuels and Materials Handling

(Auspices of Fuels and Materials Handling Divisions)

Low-Temperature Distillation of Low-Grade Fuels, Max Toltz.
Modern Developments in the Coke Industry, A. R. Powell.
Mechanical Engineering in Coal Mines, Eugene McAuliffe.

Agriculture

(Joint Session with American Society of Agricultural Engineers)

Power in Agriculture, E. A. Stewart.
Mechanization of Agriculture, L. J. Fletcher.

Wednesday Morning, August 29

Power

(Auspices of Hydraulic and Power Divisions)

Operation of a Combined Steam and Hydro System, James A. Colvin.

Analysis of Costs of Variable-Load and Multiple Power Supply, Edward H. Scofield.

Ohio Falls Hydro Development at Louisville Meets Unusual High-Water Conditions, Harrison G. Roby.

Iron Mining

(Auspices of St. Paul Local Committee)

Mechanical Engineering in Iron-Ore Industry, Anton Tancig.
Use of Electric Power in Iron Mining, A. C. Butterworth.

Thursday Morning, August 30

Printing Industries

(Auspices of Printing Industries Division)

Why Engineering in Printing? Edward T. Miller.
Pulp-Grinder Control Reduces Paper Costs, Adolph F. Meyer.
Pumping Problems in Paper Mills, Helmer N. Anderson.

Flour Milling

(Auspices of St. Paul Local Committee)

Power in the Flour Mills at Minneapolis, Maurice Dwight Bell.

Research

(Auspices of St. Paul Local Committee)

Friction in Dredge Pipes, James H. Polhemus and John R. Du Priest.
Investigation of Insulated Walls, Frank B. Rowley.

New England Industries Meeting

Boston, Mass., October 1-3, 1928

Boston extended a most cordial welcome to the Society on the occasion of its New England Industries Meeting, October 1 to 3, 1928, which was attended by over five hundred members and guests. An excellent program of entertainment events, technical sessions, and excursions to the interesting plants in and around Boston, filled the three days of the meeting for the men. The ladies were entertained by visits to historical points of interest in Boston and the surrounding country and enjoyed other special features arranged for them.

Conferences and Committee Meetings

The Council held a meeting on Monday morning with Vice-President Charles L. Newcomb in the chair. Routine business was transacted. Conferences of Local Section and Student Branch representatives were also held on Monday. The Special Research Committee on the Strength of Gear Teeth held a meeting at the M. I. T. Laboratory in Cambridge on Tuesday afternoon, and the Special Research Committee on Saws and Knives held a luncheon meeting on Wednesday.

Entertainment

A buffet supper and open house was held on the first evening of the meeting. The Baron Shiba film depicting motion-picture research in aerodynamics by means of high-speed pictures was shown, and talks on playing cards and the mechanics of golf presented by P. J. Munn and Robert W. Adams, respectively. Musical entertainment was also provided.

A banquet and dance was held on Tuesday evening in the ballroom of the Hotel Statler. Charles C. Pierce of Boston presided as toastmaster and made the evening a success. Doctor Ira N. Hollis, past-president of the Society, extended a welcome on behalf of the Boston engineers. He pointed out that each meeting of the Society was a monument of friendship; Charles L. Newcomb, vice-president, responded in like vein. Lieutenant S. L. Willis, of the Aeronautic Branch of the Department of Commerce, represented the Hon. W. P. MacCracken, Jr., who was expected to speak on " The Development of Commercial Aviation." Lieutenant Willis presented an exceedingly interesting outline of the activities of the Department of Commerce in regulating 140 airplane factories, supervising 13,000 miles of airways, and overseeing the licensing of pilots and inspecting airplanes.

The final feature of the evening was a fascinating talk by Doctor Harrison E. Howe on " The Place of Science in the New Competition." After his talk the floor was cleared and the party enjoyed dancing until a late hour.

Excursions

Tuesday and Wednesday afternoons were given over to special excursions. On the first afternoon the Ford Motor Company Assembly Plant at Somerville and the West Lynn plant of the General Electric Company were visited. On Wednesday the Charles Leavitt Edgar Station of the Edison Electric Illuminating Company, located in Weymouth, and the plant of the Gillette Safety Razor Company were open for inspection.

Ladies' Program

The special program for the ladies opened with a trip to the Salada Tea Company on Monday afternoon. After inspection of the building, which houses an extensive collection of antique Oriental art pieces, tea was served by the Company. On Monday evening a card party, with special entertainment, was held at the Hotel Statler, headquarters for the meeting.

On Tuedsay there was an all-day trip to Lexington and Concord, with tea at the Wayside Inn at Sudbury. A stop was made to inspect the Priscilla Proving Plant in Newton, where household appliances are tested for the *Modern Priscilla* and other magazines. The party returned to the hotel in time for the banquet in the evening.

A bus trip through Old Boston, with stops at various points of interest, on Wednesday morning, and a visit in the afternoon to the plant of the Lever Brothers Company, in Cambridge, makers of "Lux," completed the program.

Technical Sessions

Ten technical sessions were marked by the volume and excellence of the discussion. The topics for the papers were selected to give the members in New England an opportunity to discuss their many technical problems. The program for the sessions follows.

Monday Afternoon, October 1

Materials Handling

(Auspices of Materials Handling Division)

Handling Marine Shipments of Pulpwood: Improved Methods for Large Operations, Daniel W. Coe.

Material Handling in Sugar Refining, C. G. Spencer.

The New Ford Car (*Motion picture*).

Education and Training for the Industries of Non-College Type

(Auspices of Committee on Education and Training for the Industries)

Apprentice System of Lynn Plant, General Electric Company, Charles K. Tripp.

Experience in the Selection of Apprentices with the Aid of Tests, Walter S. Berry.

Tuesday Morning, October 2

Management

(Auspices of Management Division)

Progress in New England, William J. Fortune.
Proper General Management of Industry, Jerome R. George.

Applied Mechanics (I)

(Auspices of Applied Mechanics Division)

Design of Columns of Varying Cross Sections, A. Dinnik (*translated by* M. Maletz).
The Mechanics of Plate Rotors for Turbo-Generators, J. P. DenHartog.

Aeronautics

(Auspices of Aeronautic Division)

Air Transportation in Relation to New England, Sumner Sewall.
Description of a Modern Aviation Engine, A. Willgoos.
A Review of Ball and Roller Bearings in Aircraft, F. W. Mesinger.

Railroad

(Auspices of Railroad Division)

Car Retarders, a Recent Development in Railway-Yard Operation, L. Richardson.
Electric Interlocking System, R. J. Cullen.
Intermittent Inductive Auto-Manual Train Stop, H. S. Walton.

Wednesday Morning, October 3

Power

(Auspices of Power Division)

Power Supply for New England Industry, Frank M. Gunby.

Applied Mechanics (II)

(Auspices of Applied Mechanics Division)

Tests on Belleville Springs by the Ordnance Department, U. S. Army, D. A. Gurney.
Evaluation of the Technical Worth of a Steel from Physical Test Data, A. B. Kinzel.

Machine Shop Practice

(Auspices of Machine Shop Practice Division)

Internal-Grinding Development, Alden M. Drake.
Methods and Processes in a Textile Machinery Plant, J. F. McEnneny.

Wood Industries

(Auspices of Wood Industries Division)

Wood Engineering, S. W. STRATTON.

Mechanical Handling of Lumber, CARLE M. BIGELOW and THOMAS D. PERRY.

Reducing Waste by Improvement of Design and Use of Woodworking Saws and Knives—Report of A.S.M.E. Special Research Committee on Saws and Knives, CARLE M. BIGELOW.

Annual Meeting

New York, N. Y., December 3-7, 1928

Probably no one event in the yearly calendar of the Society indicates more clearly its expansion in every way than the Annual Meeting, with its varied program. The Forty-Ninth Annual Meeting of the Society, held in New York and attended by 2539 members and guests, crowded the five days from December 3 to 7, 1928, with technical sessions, committee meetings, excursions, and social events. An impression of tremendous activity pervaded the meeting, denoting the intensity of interest in each of its features. So crowded was the program that especial credit is due those who had the meeting in charge for the care with which every detail of the arrangements had been worked out, preventing confusion and resulting in smoothly running events.

Among the precautions which had been taken to insure the success of this annual gathering of the Society was the use of microphones and a public-address system in the auditorium, a system for intensifying the speech of those who need it, which suffers from none of the defects of distorted vocal tones or disturbing noises. This mechanism, under the control of an attendant, is modulated to suit the requirements of the speaker, and so perfectly did it function that few guessed that it was in operation.

Business Meeting

The business meeting of the Society, held this year for the first time in the evening (Monday) was well attended. President Dow presided. The annual report of the Council and Standing Committees was presented in abstract form by the Secretary of the Society, Calvin W. Rice. The next business was the presentation of awards, which in the absence of Dr. Hollis, Chairman of the Committee on Awards, was done by L. P. Alford, also of that Committee. The first was the Junior Award to Michael D. Aisenstein, hydraulic engineer of the Byron Jackson Pump Co., Berkeley, Calif., for his paper on " A New Method of Separating the Hydraulic Losses in a Centrifugal

Pump." In Mr. Aisenstein's absence the award was received by Ely C. Hutchinson, who expressed the former's pleasure at the honor accorded him.

The Charles T. Main Award was given to Robert M. Meyer, of the Newark College of Engineering, for his paper on "Scientific Management and Its Effect on Manufacturing." Mr. Meyer was present to receive the award. The Student Award was bestowed on Clarence C. Franck, of Johns Hopkins University, for his paper on "Condition Curves and Reheat Factors for Steam Turbines." Mr. Franck, who is now with the Westinghouse Electric & Manufacturing Co., received the award in person.

Two standards were then read by title: Standards for Letter Symbols for Electrical Quantities, and the Tentative American Standard for Aeronautical Symbols.

The meeting was then thrown open by President Dow for the transaction of new business, whereupon John C. Parker, of Philadelphia, addressed the assemblage briefly, speaking in endearing terms of "Uncle John" Brashear and asking all to stand with bowed heads in his memory. The meeting was then adjourned to Tuesday evening, when the names of those selected by the Local Sections delegates to serve on the Nominating Committee for 1929 were announced, as follows:

Group I — James A. Hall, *Chairman,* Providence, R. I.; Carlton A. Read, Worcester, Mass., *Alternate*
Group II — Vincent M. Frost, *Secretary,* Newark, N. J.; W. W. Macon, New York, N. Y., *Alternate*
Group III — Nevin E. Funk, Philadelphia, Pa.; Mortimer F. Sayre, Schenectady, N. Y., Donald B. Prentice, Easton, Pa., *Alternates*
Group IV — William B. Tuttle, San Antonio, Tex.; Eugene W. O'Brien, Atlanta, Ga., *Alternate*
Group V — John A. Hunter, Pittsburgh, Pa.; Albert E. White, Ann Arbor, Mich., *Alternate*
Group VI — Dean E. Foster, Tulsa, Okla.; Max Toltz, St. Paul, Minn., *Alternate*
Group VII — Leonard Cahoon, Salt Lake City, Utah; Walter H. Trask, Jr., Salt Lake City, Utah, *Alternate.*

Council Meetings

An all-day final meeting of the 1928 Council was held on Monday, December 3, and the organization meeting of the 1929 Council on Friday morning, December 7. The Council held luncheon meetings with the Local Section delegates on Monday, and Student Branch delegates on Wednesday.

On Monday evening the Council met with members of the Professional Division committees for dinner. President Dow was unable to attend but a message from him to the Divisions was presented by E. A. Muller, Vice-President of the Society. R. T. Kent, retiring chairman of the Standing Committee on Professional Divisions, presided at the dinner. Park Sowden was presented as the new appointee on the committee, and Archibald Black was appointed its new chairman.

Robert M. Gates, retiring chairman of the Meetings and Programs Standing Committee, introduced Professor S. W. Dudley of Yale, the next chairman.

Fiftieth Anniversary of the Society

Plans for the celebration of the Fiftieth Anniversary of the Society at Stevens Institute of Technology, where the Founders met, and in Washington, D. C., in 1930, were discussed at a joint meeting of the Committee on Meetings and Program with the Fiftieth Anniversary Advisory Committee on Wednesday afternoon.

Employment Service

A meeting of the Employment Service was held on December 5 to consider the establishment of a branch office in Los Angeles, Cal.

Economic Status of the Engineer

The special committee of the Council on the Economic Status of the Engineer held a meeting on Thursday morning at which plans were made to prepare a questionnaire on this subject to be mailed to the entire membership of the Society.

Professional Divisions

The Executive Committees of nearly all the Professional Divisions and some of the Sub-Committees held meetings during the week for the discussion of their work and plans for the year. The Applied Mechanics Division authorized a Sub-Committee on Sound Investigation and Wm. Braid White was appointed its chairman. The Iron and Steel Division endorsed the proposal to submit to the Society a research project on Heavy Duty Anti-Friction Bearings. The Hydraulic Division organized a committee on Standardization of Shaft Couplings.

Progress reports of the Divisions were presented at the various technical sessions of the meeting. The dinner with members of the Council on Monday evening is recorded under the heading " Council Meetings."

Local Sections Conference

The annual conference of Local Section delegates held on the first day of the Annual Meeting had an attendance of 67 representatives of the 70 Local Sections. One of these Sections, that embracing the

Youngstown district, was authorized at the Council Meeting on December 3, the announcement being made at this Conference.

Prior to the Conference a number of committees, representative of the various Sections, were appointed to develop reports on various phases of Local Section activities for discussion at the Conference. These reports concerned the problems of both the smaller and the larger Local Sections, and the question of holding the Annual Meeting of the Society in cities in the East other than New York. The Conference considered that under present conditions the Meeting should not be held outside New York.

The matter of securing good papers for Local Section meetings was discussed at length, as was also cooperation with the Professional Divisions and Student Branches.

The licensing of engineers was given special consideration. As a result of a discussion of this matter, a resolution was adopted encouraging the Local Sections to cooperate in the development of the uniform law on the subject.

A number of Standing Committees had their chairman or other representative present to call the attention of the delegates to important activities in which Local Sections could cooperate, such as standardization and research work of the Society, the Library, which aims to supply information through the mails to all members who cannot visit it in person, and also the Professional Divisions, Student Branches, and Membership Committee. The Chairman of the Membership Committee, Hosea Webster, who has served continuously for twenty years, described the procedure of the Committee in some detail. As a result of the discussion, a number of the Sections requested that in the future they be provided with copies of the records of all applicants in their respective territories. This would not only bring new members promptly to the attention of the respective Sections in which they were resident, but would obviously contribute to the development of their interest in Society activities generally.

The 1929 Nominating Committee

The important feature of the Conference was the selection by the delegates, who were divided into seven geographical groups, of the members and alternates of the Nominating Committee of the Society for 1929. The names of those selected in individual meetings of the groups of delegates were reported to a session of the Conference on Tuesday afternoon and announced at the Business Meeting of the Society that evening.

Taking advantage of their group meetings, the delegates formed permanent organizations to foster inter-section activities and national meetings within their respective territories, and to further in every possible way the progress of the Society.

Local Section Committee Meetings

The final meeting of the 1928 Committee on Local Sections was held on December 2. The 1929 Committee was organized at a meeting on Thursday morning, December 6, and in the afternoon met with the Committee on Meetings and Program to consider joint problems.

"Student-Branch Day"

The executive council of the Metropolitan Student Branches organized and carried out five inspection trips on the morning of Wednesday, December 5. Over two hundred Student Branch members and delegates took part in trips to the E. W. Bliss Co., the United States Navy Yard, the New York Edison Co., Brooklyn Edison Co., and the new Motor Ship *Kungsholm.*

COUNCIL-STUDENT BRANCH LUNCHEON

President Dow and President-Elect Sperry were the guests of the Committee on Relations with Colleges at the Council-Student Branch Luncheon. There were eighty-one in attendance, including many members of Council and representatives of twenty-seven Student Branches. Short addresses of welcome were given by both Mr. Dow and Mr. Sperry.

STUDENT BRANCH SESSION

In the afternoon a Student Branch Session was held with an attendance of over two hundred, including 129 professors, students, and graduates who represented 48 of the 94 Student Branches. Vanderbilt University, whose petition for the establishment of a Student Branch was approved by Council the previous day, was represented by a recent graduate now living in the vicinity of New York. Over fifty outstanding members of the Society showed their interest in the Student Branch movement by their attendance.

Prof. E. F. Church, Jr., Chairman of the Committee on Relations with Colleges, presided at the meeting. The new policy, adopted this year, included in the program several well-known members of the Society as speakers.

J. G. Hatman of the Philadelphia Section and John Everetts, Chairman of the Metropolitan Student Branch Executive Council, outlined the organizations of the Student Branches with the Local Sections in the Philadelphia and Metropolitan districts.

G. E. Sanford and Colonel John Price Jackson each spoke briefly on the subject of "Safety," emphasizing the willingness of the National Safety Council and its Student Branch liaison members to cooperate in arranging for speakers and films to promote safety in the various engineering institutions.

Charles W. Morris of New York University gave a short humorous talk, which he illustrated on the blackboard by punning on various aeronautical terms.

Dr. A. A. Adler gave a very interesting talk on "Possibilities in the Application of Engineering to Plant Economy in the Smaller Industrial Plants."

Archibald Black then outlined the development of the airplane industry and the building up of commercial airplane service, bringing out many points to be considered by students who plan to go into these phases of engineering.

At the eleventh hour, William Monroe White of Milwaukee, Wis., very kindly consented to speak in place of R. J. S. Pigott, who was unavoidably detained. Mr. White took Mr. Pigott's subject, "Opportunities for the Young Engineer," and stressed the point that there are far more opportunities today than there were twenty years ago for young engineers to develop themselves in their profession.

At the close of Mr. White's talk, the meeting was thrown open for business and discussion. The advisability of charging a fee to Student Branch members to be paid to the National Society, methods of operating a Student Branch, and the relative value of compulsory and voluntary attendance at Student Branch meetings were brought up and commented upon by various delegates. Dean R. L. Sackett of Pennsylvania State College suggested a scheme for arranging a system of prizes which would encourage the Student Branches to develop a real program.

Plans for Student Branch Activities

Plans for future activities of Student Branches were the subject of a number of committee meetings and conferences during the week of the Annual Meeting. The Honorary Chairmen of the Branches held a luncheon meeting on December 6. Two meetings of the Committee on Education and Training for the Industries took place. The Committee on Relations with Colleges held its own meeting and also a joint session with the Committee on Awards. The secretaries and representatives of the committees in charge of college relations of the four national engineering societies held a conference on Thursday, December 6.

Research

In the research activities sponsored by the Society one sees concrete expression of the new spirit of cooperation in industry through mutual self-help in the solution of common technical problems. One has but to glance at the program of research committee meetings and sessions at the Annual Meeting to appreciate the health and significance of this activity.

The power field was represented by committees on boiler-feedwater studies and condenser tubes, the machine-shop practice field by the committee on cutting of metals, the wood industries by a committee on saws and knives, and so on, while the programs of many of the other committees that met, such as those on lubrication, mechanical springs, strength of gear teeth, etc., concern the whole broad field of mechanical engineering. Statistics are always of interest, and when fairly presented are indicative of the trend of the times. In this connection certain figures relating to A.S.M.E. research-committee activities at the Annual Meeting are illuminating. The 14 committees which met drew a total attendance of 175 persons. In addition five of these committees held open sessions for discussion of their reports and related papers, attracting an average of well over 100 persons at each session.

The growth of A.S.M.E. research activities is due in no small degree to the vision, enthusiasm, and energy of one man—R. J. S. Pigott—who, after fourteen years as a member of the Main Research Committee and the past five years as its chairman, retired from active membership this year. In recognition of his conspicuous service to the Society in the field of research he was presented with an engraved testimonial at the dinner meeting of the Main Committee on Thursday evening, December 6, by his various associates during the period of his membership.

Each Annual Meeting records a step forward in the extension of the Society's research efforts into broader fields. Speaking before the Conference of Local Sections Delegates, Chairman Pigott outlined three proposals from the Main Research Committee which, if followed, will contribute materially to the broadening of Local Sections' activities and the increased effectiveness of the Society in the field of cooperative research. These proposals call for the formation of research survey groups in certain Local Sections, joint sessions with trade associations and technical societies meeting in Local Section areas for discussion of pertinent Special Research Committee reports, and the building up of closer relations between local engineering colleges and A.S.M.E. research activities.

Under the leadership of Prof. Albert E. White, Director of the Department of Engineering Research, University of Michigan, and the new chairman of the Main Research Committee, the Society may look forward confidently to increased and useful activity in the field of cooperative engineering research—a field which it is in a unique position to develop.

STANDARDIZATION

Another very important activity of the Society is its work in the field of standardization. The Standardization Committee of the Society held its quarterly meeting on Thursday afternoon, December 6, and many of its sectional and sub-committees met at various times during the week.

After the disposal of routine business the Main Committee discussed the proposed Study Courses in Standardization and made plans looking toward the completion of material for such a course and its publication in convenient form for the use of the Local Sections and other groups interested in the subject.

SMALL TOOLS AND MACHINE TOOL ELEMENTS

The sectional committee which held the greatest number of meetings during the week was that on the Standardization of Small Tools and Machine Tool Elements. The main committee met on Thursday morning and meetings of the following technical committees were held on other days.

Technical Committee No. 3 on Machine Tapers. The report of the Sub-Committee on Taper Series was discussed and an alternate proposal developed, based on the use of the Morse tapers for certain sizes. The Technical Committee requested the Sub-Committee to prepare arguments for both of these proposals, and to distribute this information with the proposed standard series.

Technical Committee No. 4 on Spindle Noses and Collets for Machine Tools. This Committee held its organization meeting and elected E. F. DuBrul chairman. The Committee outlined and discussed the scope of its work and appointed Sub-Groups to initiate the activity and to develop proposals for submission to the Technical Committee. Since the representation on this Committee was not considered comprehensive enough, it was decided to add to the personnel certain other branches of the machine-tool industry.

Technical Committee No. 5 on Milling Cutters. The proposed standards covering Nomenclature, Profile Cutters, and Keys and Keyways, copies of which had been previously circulated, were thoroughly discussed and revised. The Committee then recommended that they be distributed for criticism and comment prior to being submitted to the Sectional Committee for approval by letter ballot. The Sub-Group on Formed Cutters reported that their proposal was in the hands of the printer, and that page-proof copies would be circulated within a short time for criticism and comment. No reports were received from the Sub-Groups on Hobs and Inserted-Tooth Facing Cutters.

Technical Committee No. 6 on Designations and Working Ranges of Machine Tools held its organization meeting and elected E. F. DuBrul temporary chairman. The committee discussed the scope of the project and recommended that the " Classification Schedule " prepared by the National Machine Tool Builders Association in cooperation with the War Department be circulated to the committee for consideration in connection with the development of their proposed standards.

Technical Committees Nos. 7 and 8 on Drill Sizes and Drill Bushings. These two Technical Committees held a joint meeting at which the simplification and standardization of drill sizes was thoroughly discussed. Prior to the meeting Carl J. Oxford, chairman of Committee No. 7, had prepared a simplification chart showing a proposed 30 per cent reduction in the number drills on the manufacturers' list. At the meeting C. E. Rundorff, chairman of Committee No. 8, submitted a similar list proposing a still further reduction and a slight difference in the selected list. After full discussion the chairman appointed a Sub-Committee of three to study this material and other available data for the purpose of drafting a proposal which would meet the views of the Technical Committee.

Technical Committee No. 9 on Punch and Die Holders. This Committee held its organization meeting and elected Sidney Dimant Chairman. The various punch and die holders in use were discussed and it was decided to invite industry to suggest the type of holders and dimensions which should be standardized.

Technical Committee No. 11 on Chuck and Chuck Jaws. The organization meeting of this Technical Committee was held and J. E. Lovely elected chairman. Two Sub-Groups were appointed, each consisting of five members. The first Sub-Group was appointed to initiate work on the standardization of chuck jaws, and the second, to undertake the standardization of adapters.

Technical Committee No. 12 on Cut and Ground Taps. This Technical Committee was formed with Charles M. Pond as chairman, to review a series of standard dimensions for cut and ground taps which had been previously prepared by an informal committee functioning under the auspices of the National Screw Thread Commission. The immediate purpose of the review was to ascertain if this material was of the kind which should be submitted for approval to the joint sponsors.

Advance copies of the proposed standard had been distributed to the Committee, so that it came prepared to pass on this material. It decided to make slight revisions to certain of the proposed tables and to include certain additional tables which the manufacturers of cut and ground taps were to supply.

CODE FOR PRESSURE PIPING

At the meeting of the Sectional Committee on the Code for Pressure Piping, it was reported that the sections on Power Piping, Gas and Air Piping, Materials, and Oil Piping had been drafted and distributed in mimeographed form to the members of the Sectional Committee for comment. One of these Sections dealing with Oil Piping has been released by the Editing Committee for general distribution for criticism and comment.

Prior to the meeting of the Sectional Committee, Sub-Committee No. 2 on Power Piping and Sub-Committee No. 8 on Fabrication Details held meetings at which substantial progress was made in the development of these two sections of the code.

THE MECHANICAL STANDARDS ADVISORY COUNCIL

The permanent organization meeting of the Mechanical Standards Advisory Council was held on Monday, December 3. The first conference looking toward the solution of the problem as to " what," " when," and " how " to standardize was called by the A.S.M.E. on April 7, 1926. The formation of the Advisory Council was approved at a second conference on June 20, 1928. At the third conference, on December 3, a large percentage of the sixty organizations having an interest in standardization in the mechanical engineering field were represented.

GRAPHIC PRESENTATION

Sub-Committee No. 2 on Terminology, of the Sectional Committee on Standards for Graphic Presentation, held a luncheon meeting at which it was decided to supplement the 26 definitions which had been circulated for criticism and comment, by the definitions of a series of terms dealing more directly with graphic presentation.

DRAWINGS AND DRAFTING ROOM PRACTICE

Several meetings of sub-committees of the Sectional Committee on Drawings and Drafting Room Practice took place during the Annual Meeting. No. 2 on Method of Indicating Dimensions discussed at length a proposal drafted by its chairman, Edmund B. Neil, after a careful study of the practises enforced in many industrial plants of the country. Meetings were also held by No. 3 on Lettering, No. 4 on Layout, No. 5 on Line Work, and No. 6 on Graphical Symbols on Drawings, at which progress reports were furnished and future work discussed.

PIPE THREADS

Sub-Committee No. 3 on Straight Pipe Threads held a meeting with A. S. Miller, temporary chairman, in the chair. General discussion as to size of taps, dies, and gages resulted in the appointment of a sub-group to determine whether a common standard could be used and to recommend such a standard and a method for gaging.

Sub-Committee No. 6 on Special Threads for Thin Tubes elected Chas. C. Winter as permanent chairman. E. S. Sanderson had been temporary chairman since the organization of the sub-committee. It was decided that the ultimate recommendations of the American Standard on Threads for Thin Tubes should be based on the proposed Section VII of the 1924 reports of the National Screw Thread Commission. The Committee also planned to investigate standards in use for fine threads for brass tubing, as it was believed that many manufacturers were not using the standards of the N.S.T.C.

SHAFTING

Sub-Committee No. 5 on Woodruff Keys met to consider the requirements of users and the practice of producers of woodruff key seat cutters and the dimensions for seats.

Power Test Codes

A public hearing on the Power Test Code for Water-Cooling Equipment was held on Tuesday afternoon, December 4. The Main Committee met on Monday morning and individual committees on Instruments and Apparatus (with the A.S.T.M. Committee on Thermometers), Fuels, and Steam Turbines also held meetings.

Safety

A luncheon meeting of the A.S.M.E. Safety Committee was held on Friday at which it was announced that a representative of the committee had been appointed in every Student Branch of the Society. The committee voted to request all authors writing papers for publication in *Mechanical Engineering* to include as many safety features as possible.

Meetings of several sub-committees of the Sectional Committee on a Safety Code for Conveyors and Conveying Machinery were held during the week.

Boiler Code

The Boiler Code Committee of the Society held an all-day meeting on Friday, December 7, and its Sub-Committee on Rules for Care of Power Boilers in Service met on the preceding afternoon.

Excursions

The many excursions planned throughout the week were run off according to schedule, and were well attended, with about 150 taking the trip to the Hell Gate Station of the United Electric Light & Power Co., the M. W. Kellogg Co., in Jersey City, and the Kearny Power Station of the Public Service Electric & Gas Co. in Kearny, N. J. About 200 visited the *Kungsholm,* a new motorship of the Swedish-American Line, and the U. S. Navy Yard at Brooklyn. The *Kungsholm* trip was so popular that many requests were received for this excursion that could not be filled, as but 200 passes were available. Another excursion was therefore organized to the turbo-electric ship *Virginia,* and 200 were glad to take advantage of the opportunity provided to visit it.

The men were also invited to participate in the ladies' excursions to Ellis Island, the American Museum of Natural History, and Roosevelt House.

Social Events

"OPEN HOUSE"

The first of the social events of the meeting was the "Open House," following the business session on Monday evening. The ladies enjoyed a program by Vernon Stone and Electra Pratt, comedians, on the eleventh floor of the Engineering Societies Building, while the men held their get-together in the lobby and on the fifth floor.

PRESIDENTS' NIGHT

Tuesday evening brought Presidents' Night with its reception and dance. After a brief business meeting at which the Nominating Committee for 1929 was announced, honorary membership was awarded to two past-presidents, Ira N. Hollis and Mortimer E. Cooley. Dr. Hollis received the award in person, while a telegram was received from Dean Cooley, who was unable to be present.

After President Dow's address on "Consistency," published elsewhere in this volume, the tellers reported the election of the following new officers of the Society:

President: Elmer A. Sperry
Vice-Presidents: Robert L. Daugherty, William Elmer, Charles E. Gorton
Managers: Charles M. Allen, Robert M. Gates, Ely C. Hutchinson
Delegates to the American Engineering Council: E. O. Eastwood, Dean E. Foster, O. P. Hood, W. P. Hunt, Charles Penrose, Frank A. Scott, Elmer A. Sperry, Max Toltz, Edward N. Trump, D. Robert Yarnall

President-Elect Sperry was then introduced and adjournment was taken to the fifth floor, where the reception was held, followed by dancing.

ANNUAL DINNER

The Annual Dinner was held at the Hotel Astor on Wednesday evening.

Col. Paul Doty, a manager of the Society, was an able toastmaster. He called first on President Dow, who introduced guests and officers of the Society. Among those presented were Dr. Masawo Kamo, Dean of Engineering, Tokio Imperial University; the presidents of the American Institute of Mining and Metallurgical Engineers, George Otis Smith, the American Management Association, C. F. Ching, and the American Society of Refrigerating Engineers, G. B. Bright; Commander R. S. Griffin, honorary member of the Society; Dr. Wheeler P. Davey, the 1928 Thurston Lecturer; Dr. C. H. Lander, the leading fuel technologist of Great Britain; Worcester R. Warner, Ambrose Swasey, James Hartness, D. S. Jacobus, Ira N. Hollis, Charles T. Main, Dexter S. Kimball, Fred R. Low, William F. Durand, William L. Abbott, and Charles M. Schwab, Past-Presidents of the Society.

The new members of the Society were welcomed by Charles M. Schwab, who closed his remarks and advice to them by saying, " There is nothing that will bring you such recompense as loyalty; loyalty to those with whom you are associated, loyalty to the man for whom you work, loyalty to those connected with you in business, loyalty to your organization, The American Society of Mechanical Engineers, and loyalty to this great and glorious country of ours."

The toastmaster then called on President-Elect Sperry, who spoke briefly of his office as president, and called attention to the World Engineering Congress to be held in Tokio in 1929.

Of the many tributes paid during the evening, none was more graceful than that by Mr. Schwab to Julian Kennedy in conferring upon him the A.S.M.E. Medal for his services and contributions to the iron and steel industry, when he said that " No one man has done anywhere near so much, nor any two men, as has Julian Kennedy for the great iron and steel industry . . . I say publicly before this great Society tonight that Julian Kennedy is not only one of the greatest engineers, one of the finest men, but also one of the best friends I ever had in my long lifetime."

The final speaker on the program was Dr. E. E. Free, a consulting scientist, New York, who spoke on his studies of human-engineering material. At the close of his address, the room was cleared for dancing.

COLLEGE REUNIONS

Thursday evening, December 6, was set aside for the reunions of the various technical colleges. About ten reunions were held on that day and several others on other days during the week.

Ladies' Program

In addition to their " Get-Together " on Monday evening, and the Presidents' Night and Annual Dinner, there were several events for the members of the Woman's Auxiliary to the A.S.M.E. and their guests. The Fifth Annual Meeting of the Auxiliary was held at a luncheon on the second day of the meeting at the Hotel Astor. The program included an address by Mrs. Vernon Kellogg, Lecturer and writer, of Washington, D. C., on "Youth, the Bridge Builder."

On Wednesday morning a choice was offered of a trip to Ellis Island or an inspection trip through the Studio and Institute of Good Housekeeping Magazine, with an informal talk by Miss Fisher, Director of the Institute. In the afternoon the Annual Tea of the Auxiliary was held at the American Museum of Natural History. George H. Sherwood, Director, presented a brief address, and the guests were conducted through the taxidermy shop and laboratories not open to the public.

Ladies were invited to participate in the excursion to the motorship *Kungsholm* on Thursday morning, and in turn the men were invited to attend the reception and tea at Roosevelt House in the afternoon. After an inspection of the Museum and House, motion pictures were shown on the "Building of the Panama Canal and the Life of Theodore Roosevelt." Mrs. Douglas Robinson received at the reception.

Robert Henry Thurston Lecture

The third Thurston lecture was given by Dr. Wheeler P. Davey, Professor of Physical Chemistry at Pennsylvania State College, on Thursday afternoon, December 6. His subject was "The Elastic Properties of Materials as Shown by Crystal Structure Investigations."

Technical Sessions

The following summary of the programs of the technical sessions of the meeting show joint sessions with other organizations. Members of the American Society of Refrigerating Engineers, the Power Transmission Association, and the Taylor Society, whose annual meetings were held during the week, were invited to attend the sessions of the A.S.M.E., and *vice versa.*

The Seventh National Exposition of Power and Mechanical Engineering at Grand Central Palace also paralleled the A.S.M.E. meeting and attracted a large number of members of the Society.

Monday Afternoon, December 3

Machine Shop Practice (I)

Fixture Design

(Auspices of Machine Shop Practice Division)

Progress Report of Machine Shop Practice Division, presented by L. C. Morrow.

Principles of Jig and Fixture Practice, Joseph W. Roe.

Applied Mechanics (I)

(Auspices of Applied Mechanics Division)

Deflection of a Round-End Strut Subjected to a Constant Moment or a Transverse Force at the Middle, James E. Boyd.

Stress Distribution in Rotating Disks of Ductile Material after the Yield Point Has Been Reached, A. Nádai and L. H. Donnell.

Hydraulic (I)

(Auspices of Hydraulic Division)

Flow in Pipes (*Read by title*), Michael D. Aisenstein.

Dredge-Pump Pressures and Thrust Loads, James H. Polhemus and James Healy.

Tests on Small Rotary Pumps, Dipl.-Ing. F. Aschner and Dipl.-Ing. L. Mattheus.

Tuesday Morning, December 4

Industrial Power

(Auspices of Power Division)

Effect of Alloying Elements upon the Stability of Steel at Elevated Temperatures, A. E. White and C. L. Clark.

Balancing Heat and Power in Industrial Plants, Robert V. Kleinschmidt.

Machine Shop Practice (II)

SYMPOSIUM: METHODS OF MOTOR APPLICATION AND CONTROL

(Auspices of Machine Shop Practice Division)

Methods of Motor Application and Controls on Lathes, Chas. L. Cameron.

Motors for Planer Service, F. E. Cardullo.

Motor Drives for Precision Grinding Machines, R. E. W. Harrison.

Application of Motors to Special Drilling and Tapping Machinery, J. H. Mansfield.

Hydraulic (II)

(Auspices of Hydraulic Division)

Progress Report of Hydraulic Division, presented by R. L. Thomas.

Some Interesting European Hydraulic Turbine Research, Blake R. Van Leer.

New Aspects of Maximum Pressure Rise in Closed Conduits, S. Logan Kerr.

Applied Mechanics (II)

(Auspices of Applied Mechanics Division)

Graphical Methods for Least-Square Problems, Everett O. Waters.

Design of Ellipsoidal Heads for Pressure Vessels, T. W. Greene.

Tuesday Afternoon, December 4

Education and Training for the Industries of Non-College Type

(Joint auspices of Committee on Education and Training for the Industries and the Society for the Promotion of Engineering Education)

Preliminary Findings of a study of Intensive Types of Technical Education, Robert H. Spahr.

Machine Shop Practice (III)

(Auspices of Machine Shop Practice Division)

Mechanical Applications of Chromium Plating, W. Blum.

Carboloy and Tungsten Carbide Tools, Samuel L. Hoyt.

Materials Handling (I)

(Auspices of Materials Handling Division)

Progress Report of Materials Handling Division, presented by C. B. Crockett.

The Materials-Handling Problem in the Public Utility, John C. Somers.

Wednesday Morning, December 5

Management (I)

(Auspices of Management Division, with Production Executive Division of American Management Association Cooperating)

A Basis for Evaluating Manufacturing Operation, L. P. Alford and J. E. Hannum.

Railroad (I)

(Auspices of Railroad Division)

Progress Report of Railroad Division, presented by Marion B. Richardson.

Solid Carbon Dioxide for Railway Refrigerating Cars, J. W. Martin, Jr.

Characters of Injectors, R. M. Ostermann.

Oil and Gas Power

(Auspices of Oil and Gas Power Division)

Report of Sub-Committee on Oil Engine Power Cost, Oil and Gas Power Division, presented by F. Eder.

A Simple Method of Comparing Oil-Engine Performances, Otto Nonnenbruch.

Progress Report of the Oil and Gas Power Division, presented by Julius Kuttner.

Fuels

(Auspices of Fuels Division)

Progress Report of the Fuels Division, presented by J. T. Ward.

Coal Pulverizers, W. J. A. London.

Wednesday Afternoon, December 5

Illumination

(Jointly with Illuminating Engineering Society)

Designing Buildings for Daylight, H. H. Higbie and W. C. Randall.

Artificial-Lighting Provisions in Building Design and Process Layout, Ward Harrison.

Light as a Factor in Production, C. C. Munroe.

Railroad (II)

(Auspices of Railroad Division)

The Schmidt High-Pressure Locomotive of the German State Railway Company, R. P. Wagner.

The Balancing and Dynamic Rail Pressure of Locomotives, R. Eksergian.

Steam Tables Research

(Auspices of A.S.M.E. Special Research Committee on Steam Tables)

Report of Executive Committee, Steam Table Fund, Geo. A. Orrok.

Progress Reports on the Work of the Steam Table Fund:

Massachusetts Institute of Technology, F. G. Keyes and L. B. Smith. Presented by Dr. Keyes.

Bureau of Standards, N. S. Osborne, Harold F. Stimson and E. F. Fiock. Presented by Mr. Osborne.

A Revised Mollier Chart for Steam Extended to the Critical Point, J. H. Keenan.

Discussion, led by Dr. Harvey N. Davis.

A General Steam Equation? R. C. H. Heck.

Thursday Morning, December 6

Central Station Power

(Auspices of Power Division)

Design of Steam Piping to Care for Expansion (*Read by title*), W. H. Shipman.

Influence of Coal Type on Radiation in Boiler Furnaces, Walter J. Wohlenberg and R. L. Anthony.

The Peak-Load Problems in Steam Power Stations, A. G. Christie.

Management (II)

(Auspices of Management Division, with Production Executive Division of American Management Association Cooperating)

Outstanding Economic and Technical Factors involved in the Engineering of New Manufacturing Equipment, J. R. Shea.

The Executive Function in Industry, Robert T. Kent.

Management Engineering in the Smaller Industrial Plants, J. E. Dykstra.

Lubrication

(Joint auspices of A.S.M.E. Special Research Committee on Lubrication and the Machine Shop Practice Division)

Journal Running Positions, H. A. S. Howarth.

Friction of Journal Bearings as Influenced by Clearance and Length, S. A. McKee and T. A. McKee.

Cooling and Lubrication of Cutting Tools—Report of Sub-Committee on Cutting Fluids of Special Research Committee on Cutting of Metals, presented by M. D. Hersey.

Aeronautics

(Auspices of Aeronautic Division)

Progress Report of Aeronautic Division, presented by E. E. Aldrin.

Development of the Commercial Airplane, G. M. Bellanca.

Relation between Commercial Airplane Design and Commercial Uses of Airplanes, T. P. Wright.

Thursday Afternoon, December 6

Materials Handling (II)

SYMPOSIUM: SKID HANDLING OF INTERPLANT SHIPMENT

(Auspices of Materials Handling Division)

New Developments in Materials Handling, R. L. LOCKWOOD.

Savings Effected in Handling Railroad Stores by Lift Trucks and Skid Platforms, J. V. MILLER.

The Use of Skids for Water Shipments, H. E. STOCKER.

Skid Shipments, GEO. B. WRIGHT.

Economic Aspects of the Shipment of Materials on Skid Platforms, C. B. CROCKETT.

Skid-Platform Shipment of Commodities, F. J. SHEPARD, JR.

Symposium on Mechanical Springs

(Auspices of A.S.M.E. Special Research Committee on Mechanical Springs)

Stresses in Heavy Closely Coiled Helical Springs, A. M. WAHL.

Fatigue and Corrosion Fatigue of Spring Material, D. J. MCADAM, JR.

Telephone-Apparatus Springs, J. R. TOWNSEND.

Progress Report No. 4 of the Special Research Committee on Mechanical Springs, M. F. SAYRE and ANTHONY HOADLEY. Presented by PROFESSOR SAYRE.

Steam Power

BOILER-FEEDWATER STUDIES

(Auspices of Power Division and Joint Research Committee on Boiler-Feedwater Studies)

Progress Report of Executive Committee and of four Sub-Committees of the Joint Research Committee on Boiler-Feedwater Studies:

Zeolite Softeners Internal Treatment, Priming and Foaming, Sub-Committee No. 3, C. W. FOULK.

Municipal Water Supplies and the Effect of Trade Wastes in Relation to the Use of Water in Power Plant Practice, Sub-Committee No. 7, BERNARD SIEMS.

Standard Methods of Water Analysis, Sub-Committee No. 8, H. FARMER.

Bibliography of Boiler Feedwater Studies, Sub-Committee No. 9, GEORGE A. STETSON.

Fluid Meters

(Auspices of A.S.M.E. Special Research Committee on Fluid Meters)

The Laws of Similarity for Orifice and Nozzle Flows, JOHN L. HODGSON.

Orifice-Steam-Meter Coefficients, ROBERT W. ANGUS.

Progress Reports of Sub-Committees of Special Research Committee on Fluid Meters.

Friday Morning, December 7

Printing Industries

SYMPOSIUM: PAPER AND INK AS THE RAW PRODUCTS OF MANUFACTURE AND THE CONDITIONS THAT AFFECT THEM

(Auspices of Printing Industries Division)

Progress Report of Printing Industries Division, presented by EDWARD PIERCE HULSE.

Paper, and the Influence of Pressroom Conditions upon it, OTTO W. FUHRMANN.

Ink, and Atmospheric Conditions in the Pressroom, JULIUS FRANK.

Heat-Drying Equipment for Printing Presses, CHARLES HENRY COCHRANE.

Grammer Process for Prevention of Offset, HARRY C. COLE and JOSEPH S. PECKER.

Air Conditioning in the Printing and Lithographing Industry, WILLIS H. CARRIER and ROBERT T. WILLIAMS.

Static Electricity, WILLIAM C. GLASS.

Refrigeration

(Joint Session with A.S.R.E.)

Freight Car Refrigeration by an Adsorption System Employing Silica Gel, GEORGE E. HULSE.

A Graphical Treatment of Heat-Exchange Problems, JOS. S. STEPANOV.

Wood Industries

(Auspices of Wood Industries Division)

Progress Report of Wood Industries Division, presented by WM. BRAID WHITE.

The Application of Universal Chucks to Woodworking Machinery, A. E. ENGLUND.

Ball Bearings as Applied to Woodworking Machinery, H. E. BRUNNER.

Lubrication of Ball-Bearing Woodworking Spindles, HARRY R. REYNOLDS.

Reducing Waste by Improvement of Design and Use of Woodworking Saws and Knives—Progress Report of A.S.M.E. Special Research Committee on Saws and Knives, presented by CARLE M. BIGELOW.

Iron and Steel

(Auspices of Iron and Steel Division)

Progress Report of Iron and Steel Division, presented by GEORGE T. SNYDER.

Heavy-Duty Anti-Friction Bearings, SIDNEY G. KOON.

MEETINGS OF THE PROFESSIONAL DIVISIONS

Aeronautic Division

Detroit, Mich., June 28-29, 1928

The second National Meeting of the Aeronautic Division was held in Detroit, Mich., on June 28 and 29, 1928, under the auspices of the Detroit Section, with headquarters at the Book-Cadillac Hotel.

BANQUET

The social feature of the meeting was the banquet held on Thursday evening, June 28, in the Grand Ball Room of the hotel.

President Alex Dow acted as chairman, with Harvey Campbell, vice-president of the Board of Commerce, presiding as toastmaster. The chief speakers were Charles L. Lawrence, president of the Wright Aeronautical Corporation and the Hon. William P. MacCracken, Jr. The toastmaster also called on a number of celebrated aeronautic pilots, engineers, and executives for short talks. The banquet was conducted jointly with the Detroit Board of Commerce Aero Olympics Committee.

The program closed with a showing of a motion picture of flights of birds taken by Prof. Maurice Boel of Charleroi University, Belgium. Professor Boel took the film with a high-speed motion picture machine during his scientific studies on natural flight, which he described in his paper given at the Technical Session on Friday evening. When these pictures were projected at the usual rate they presented to the audience a beautiful spectacle of the graceful flight movements of birds. There were on exhibition during the evening several famous aeronautic trophies.

Inspection Trip

On Friday afternoon a visit was made to the Ford Airplane Factory and to Grosse Ile to see a new metal airship being constructed for the government by the Aircraft Development Corporation.

Following the meeting the members were guests of the Detroit Board of Commerce for several aeronautic events at the Ford Airport on June 30. The first event was the fourth international reliability airplane tour in which over twenty different makes of American airplanes competed in a 6000-mile tour for the Edsel Ford trophy. Another event was the finals of the Boys' National Model Airplane contest. This was followed by an exhibition of gliders that were recently brought from Germany. The last event was the James Gordon Bennett International Balloon Races, in which twelve balloons participated and seven nations were represented. This race is for distance traveled, not for duration of time in the air. Professor Maurice Boel was the second pilot of the Belgian balloon.

Technical Sessions

Thursday, June 28

Transport

Opening Remarks, F. H. Low.

Aviation as a Transport, W. B. Stout.

Preparation of an Airline for Commercial Operations, Jas. G. Ray.

Aeronautical Activities of the Department of Commerce, Wm. P. MacCracken, Jr.

Wood Industries

(Jointly with Wood Industries Division of A.S.M.E.)

Gluing Wood in Aircraft Work, T. R. TRAUX.
Application of Balza Wood in Aircraft, G. L. WEEKS, JR.

Power Plant

The Development and Technical Aspects of Fairchild-Caminez Engine, HAROLD CAMINEZ.
Cycloidal Propulsion Applied to Aircraft, F. K. KIRSTEN.
Technical Development of the Reed Metal Propeller, S. ALBERT REED.

Friday, June 29

Design

An Introduction to the Problem of Wing Flutter, CARL F. GREENE.
The Design of Commercial Airplanes, MAC SHORT.
Slotted Wings, F. HANDLEY PAGE.

Airways and Airships

Metereological Service for Commercial Airways, C. G. ROSSBY.
The Status of the Airship in America, GILBERT BETANCOURT.
A Comparative Examination of the Airplane and the Airship, CARL B. FRITSCHE.

General

Military Aviation, W. E. GILLMORE.
Scientific Studies of Bird Flight (Illustrated with a film), MAURICE BOEL.
Aircraft Engineering Aspects of a European Trip, V. E. CLARK.

Aeronautic Division

Wichita, Kansas, September 21-22, 1928

Wichita, Kansas, held its first Aeronautic Meeting on September 21 and 22, 1928, under the auspices of the Aeronautic Division and with the cooperation of the Engineers Society and the Chamber of Commerce. Headquarters were at the Hotel Lassen. The attendance was about one hundred, with a widespread representation of the Society.

Two technical sessions were held during the first day of the meeting, as follows:

Aircraft Engines of Medium Power

The Commercial Aircraft Engine of Medium Power, RICHARD M. MOCK.
Type Testing of Commercial Airplane Engines of Medium Power, H. K. CUMMINGS.

Problems of Commercial Plane Production

Symposium: Papers by WALTER H. BEECH, JEROME LEDERER, and E. E. PORTERFIELD, JR.
Aeroplane Fuel and Lubricants, C. F. FRANCIS.

In the evening following dinner, a session was held at which John Lyle Harrington and Professor Hayes spoke, and Mac Short discussed the high-speed 20,000 photographs-a-second aeronautic research film, which was shown.

The second day was given over to inspection of local plants—Cessna, Travel Air, Stearman, Swallow, Swift and the Supreme Propeller.

Fuels Division

Cleveland, Ohio, September 17-20, 1928

The Second National Meeting of the Fuels Division, held in Cleveland, Ohio, September 17 to 21, 1928, was marked by an excellent program of technical sessions, related plant visits, interesting entertainment and good fellowship. More than seven hundred were in attendance at the sessions and inspection trips.

ENTERTAINMENT

A buffet supper, smoker, and vaudeville entertainment was the program for the first evening of the meeting.

Charles Adams, of Cleveland, was toastmaster for the dinner on Tuesday evening. The speakers were the Honorable William R. Hopkins, City Manager of the City of Cleveland, and William B. Stout, of the Stout Air Services, Inc. The evening closed with dancing.

A second dance, held with the Cleveland Engineering Society at Euclid Beach Park, Log Cabin, was the entertainment feature of Wednesday evening.

LADIES' PROGRAM

The events scheduled for the ladies began with a card party at the Hotel Cleveland on Monday night, paralleling the men's smoker. Tuesday morning was taken up with an inspection of the Cleveland Public Library and the Bell Telephone Building, luncheon being served at the Women's City Club of Cleveland. The afternoon was spent at the Clifton Club where there was tea and music.

Wednesday morning was spent in a drive about the city, followed by a luncheon at the Canterbury Country Club, and there was a trip in the afternoon to Nela Park of the General Electric Company.

On Thursday morning there was an inspection and shopping trip to the Halle Bros. Department Store. About seventy ladies were registered at the meeting, forty of whom were from out of town.

EXCURSIONS

The major excursions during the meeting were those to the Fairmount Pumping Station of the Cleveland Water Works, the Avon Station of the Cleveland Electric Illuminating Company, the Central furnaces and docks and Cuyahoga Works of the American Steel and Wire Company, and the Cleveland Airport, where special flying manœuvers were arranged for Thursday afternoon. A number of other plants in Cleveland and Akron were open for inspection during the meeting.

Monday, September 17

Opening Session

Opening Address, Victor J. Azbe.
The Perils and Profits of Research, Thos. S. Baker.

Fuels Characteristics

Constitution and Classification of Coal, A. C. Fieldner.
Burning Characteristics of Different Coals, Henry Kreisinger and B. J. Cross.

General Session

Progress toward Direct Firing of Boilers with Producer Gas, William B. Chapman.
Washing and Preparation of Coal, H. D. Smith.

Tuesday, September 18

Industrial Session

Industrial-Furnace Efficiency, Economic Consideration, James H. Herron.
The Use of Fuels in Tunnel Kilns, W. E. Rice.

Heat Transfer

Present Tendency of Boiler-Water Conditioning, R. E. Hall.
Recent Developments and Improvements in the Baffling of Vertical Boilers, A. C. Danks.

Powdered Fuels

Fineness of Pulverized Fuel as Affected by Mill Types, Lincoln T. Work.
Collecting the Dust from Chimney Gases of Powdered-Fuel Installations, Kurt Toensfeldt.
Unit System of Coal Pulverizers for the Generation of Steam, John Blizard.

General Session

The Need for Coal Research, F. R. Wadleigh.
Determination of Economic Value in the Selection of Power-Plant Equipment, F. M. Van Deventer.

Wednesday, September 19

Refractories and Stokers

Boiler-Furnace Refractories, C. P. Hirshfeld and W. A. Carter.
Stoker Advantages and Disadvantages, Theodore Maynz.

Marine Boiler Firing

Pulverized-Coal Firing of Marine Water-Boilers, T. B. STILLMAN.

The Economic Status of Oil as a Fuel for Marine Service, GEORGE A. RICHARDSON.

Railroads

Railway Practices in Utilization and Conservation of Oil, J. N. CLARK.

Selection and Use of Fuels in Locomotive Practice, MALCOLM MACFARLANE.

Central Stations

Development and Recent Design of Stoker-Fired Equipment, JOS. G. WORKER and JOS. S. BENNETT.

Progress in Central-Station Use of Pulverized Coal, EDW. H. TENNEY.

Present Status of Furnace and Burner Design for the Use of Pulverized Fuel, E. G. BAILEY.

Railroads

The Relative Value in Locomotive Service of Different Sizes of the Same Coals, JOHN G. CRAWFORD.

Railway Practice in Utilization and Conservation of Coal, W. J. OVERMIRE.

Thursday, September 20

Smoke-Abatement I

Damage Due to Smoke, H. B. MELLER.

Smokeless and Efficient Firing of Domestic Furnaces—Part II, VICTOR J. AZBE.

Smoke-Abatement II

Problems and Methods in Smoke-Abatement Work, H. K. KUGEL.

General Conference on Smoke-Abatement.

Iron and Steel Division

Chicago, Ill., November 14-15, 1928

The Palmer House, in Chicago, was headquarters for the second National Meeting of the Iron and Steel Division, held on November 14 and 15, 1928, under the auspices of the Chicago Section, and attended by more than two hundred members and guests.

DINNER MEETING

Members of the American Management Association, holding a parallel convention in Chicago, cooperated in the dinner meeting on Wednesday evening. Musical entertainment was furnished by the Red Arrow Quartet of the Pennsylvania Railroad. Past-President Abbott opened the dinner program as the representative of President Dow. James E. MacMurray, Chairman of the Board of the Acme Steel Company, was toastmaster. Two addresses were presented, as shown in the following summary of the technical program of the entire meeting.

TECHNICAL PROGRAM

Wednesday, November 14

Opening Session

Opening Remarks, THOMAS WILSON.
Address of Welcome, C. O. FRISBIE.
Fuel, Power, and Other Services in Steel Plants, F. H. WILLCOX and GORDON FOX.
Sheet Rolling, LEON CAMMEN.

Cupolas and Nickel Steel Plate

The Hot Blast Cupola, F. K. VIAL.
The Manufacture of Nickel-Steel Plate, CHARLES MCKNIGHT and W. G. HUMPTON.

Dinner Meeting

Some Observations on European and American Steel Plants, W. TRINKS.
Taking Care of Depreciation and Obsolescence, H. V. COES.

Thursday, November 15

Bearing Metal and Lubrication

Non-Ferrous Alloys, L. E. CHRISTOPHER.
Rolling-Mill Lubrication, L. P. TYLER.

PLANT-INSPECTION TRIPS

The meeting closed Thursday afternoon with plant-inspection trips to the Gary Works of the Illinois Steel Company, the Riverdale plant of the Acme Steel Company, the Indiana Harbor plant of the Inland Steel Company, and the South Chicago Works of the Illinois Steel Company.

Machine Shop Practice Division

Cincinnati, Ohio, September 24-27, 1928

The Machine Shop Practice Division held its second National Meeting from September 24 to 27, 1928, under the auspices of the Cincinnati Section and with the cooperation of the Machine Tool Congress. Headquarters for the meeting were at the Hotel Sinton, but some of the sessions were held on the steamship *Cincinnati* during a trip up the Ohio River to Ashland, Ky., to visit the Armco plant of the American Rolling Mill Company.

The local machine-tool builders actively supported the meeting and contributed a fund to take care of the sports, amusements and prizes on board the steamer.

The meeting was attended by a splendid group of builders and users of machine tools. It was announced by L. C. Morrow, Chairman of the Division, that the Division had received and had accepted an invitation to hold its next National Meeting in conjunction with the National Tool Builders Exhibition in Cleveland the last week in September, 1929.

Following registration at the hotel on the morning of September 24, over two hundred members and guests left Cincinnati early in the afternoon. Deck sports, with prizes for winners of events, had been arranged for the afternoon. The first technical session was held in the evening.

The steamer reached Ashland early Tuesday morning, and transportation to the plant outside of Ashland was provided by automobile. The plant showed a mile and a half of unbroken, continuous operation beginning at the blast furnaces and ending in the finishing rooms and warehouses. One of the most interesting units was the sheet rolling mill, where continuous sheet rolling was successfully carried out for the first time in America. After an inspection of the entire plant, the party was returned to Ashland for luncheon, as guests of the Armco Company.

Bennett Chappelle, Vice-President of the concern, presided at the luncheon, and an address of welcome was given by J. C. Miller, Vice-President in direct charge of the Armco plant. Among the other speakers were E. A. Muller, Vice-President of the Society, R. E. Flanders, a Manager, and L. C. Morrow, Chairman of the Machine Shop Practice Division. Following the luncheon the party returned to the *Cincinnati* where further deck sports and bridge were enjoyed during the afternoon and a second technical session in the evening.

The final session was to have been held at the Hotel Sinton on Wednesday morning, but fog delayed the boat on the return trip, and, as two of the scheduled speakers, Mr. Weaver and Mr. North, were aboard, it was decided to have their papers presented during the morning. The other papers were presented at a luncheon meeting at the hotel.

Wednesday afternoon and all day Thursday were devoted to plant inspection trips. A large number of machine-tool builders furnished transportation to their respective plants.

The program of the technical sessions follows.

Monday, September 24

Aeronautic Machine Shop Problems

Inspection Methods and Quality Control in the Manufacture of Aircraft-Engine Parts, HUGH W. ROUGHLEY.

Tuesday, September 25

Lubrication

A Theory of the Lubrication of Cylindrical Bearings, FORREST E. CARDULLO.

Grooving Bearings in Machines, G. B. KARELITZ.

Wednesday, September 26

Machine Tools, Their Use and Application in Modern Manufacturing Methods

The Use and Application of Machine Tools in the Automotive Industry, L. L. Roberts.

Some Practices in the Use of Machine Tools in the Electrical Industry, J. R. Weaver.

Machine Tools in Implement and Tractor Industries, Max Sklovsky.

Machine Tools, Their Use and Application in the Railroad Industry, L. A. North.

Materials Handling Division

Philadelphia, Pa., April 23-24, 1928

The first National Meeting of the Materials Handling Division, held at the Benjamin Franklin Hotel in Philadelphia under the auspices of the Philadelphia Section, on April 23 and 24, 1928, had an attendance of nearly 350. With the exception of inspection trips on Monday afternoon, and a dinner that evening, the meeting was devoted entirely to technical sessions, and provided an excellent opportunity for the discussion of vital problems of the materials handling industry.

THE DINNER

The speakers at the dinner also dealt with materials handling subjects. E. J. Mehren, Vice-President of the McGraw-Hill Co., took as his topic " The Economic Challenge of Industrial Germany," and discussed management methods, industrial research, industrial relations, and other factors in German industry.

The other speaker was C. S. Young, General Purchasing Agent of the Pennsylvania Railroad, who gave a very interesting talk on " Materials Control " and the possibility of reducing the red-tape methods now so prevalent in attempts to control materials.

J. G. Hatman, Chairman of the Philadelphia Section, was toastmaster and entertainment was furnished by the newly organized orchestra and glee club of the Philadelphia Engineers' Club. The dinner meeting closed with the showing of the Baron Shiba aeronautic research film.

INSPECTION TRIPS

Five inspection trips were arranged for the afternoon of the first day of the meeting, as follows:

Sears-Roebuck & Co. and Atwater-Kent Mfg. Co.

Reading Railroad.

Curtis Publishing Company and Victor Talking Machine Company, Camden, N. J.

Burlington, N. J., plant of U. S. Cast Iron Pipe & Foundry Co.

Perishable Products and Fruit Terminals of the Pennsylvania, B. & O., and Reading Railroads.

These plants offered an excellent opportunity to view interior and exterior handling of varied products.

Monday, April 23

Foundry

Opening Remarks, J. G. Hatman.

Materials Handling Methods at the Eastern Steel Casting Co., Frank D. Campbell.

Materials Handling Features of the deLavaud Process of Casting Pipe Centrifugally, H. A. Hoffer.

Tuesday, April 24

Transportation

Modern Handling Methods of Railroad Transportation, G. C. Woodruff.

Marine Terminal Operation, Willard C. Brinton.

Interior Handling

Handling Methods and Equipment in a Large Mail-Order House, H. E. Odenath.

Modern Handling in Enameling Work, Edwin D. Smith.

Pneumatic Handling of Materials, Harry S. Parks.

Bulk Handling

Bulk-Material Handling at Docks and Storage Plants, Arthur F. Case.

Methods and Equipment for Fuel Handling and Ash Disposal Used in Philadelphia Electric Co., James R. McCausland.

The Hydraulic Handling of Ashes, Arthur M. Quinn.

Mechanization of Coal Mines

(Jointly with American Institute of Mining and Metallurgical Engineers and the National Coal Association.)

Fundamental Principles in Materials Handling, Harold V. Coes.

Requirements for Complete Face Mechanization in Coal Mining, Robert Y. Williams.

Oil and Gas Power Division

State College, Pa., June 14-16, 1928

The first National Meeting of the Oil and Gas Power Division and the second Oil Power Conference of the Pennsylvania State College was held at State College, Pa., June 14, 15, and 16, 1928, and was attended by more than 250 engineers and guests. The meeting was unique in that it was the first time that representatives of all large Diesel-engine manufacturers had ever gathered together to discuss the problems of their industry. It was held under the joint auspices of the Central Pennsylvania Section of the Society and the Pennsylvania State College. Headquarters were at McAllister Hall, Pennsylvania State College.

A feature of the meeting was the first exhibition of oil engines, parts, and accessories ever held in this country. Over twenty companies participated in the exhibit, which was admirably arranged in the new mechanical engineering laboratory of the college.

The various laboratories and shops of the college were open for inspection during the meeting, a special attraction being the fuel oil spray apparatus in operation.

Entertainment

The first evening of the meeting was devoted to a " Get-Acquainted Hour " on the campus. Light refreshments were served.

An informal banquet was held on Friday evening. R. L. Sackett, Dean of the School of Engineering at the Pennsylvania State College, was the toastmaster of the occasion and read to the gathering a number of greetings from European societies in the Diesel-engine field. George Heath of Carels Diesel & Steam Engines, Ltd., London, England, gave a stimulating and interesting talk on the spirit and method of cooperation practiced in England by both the manufacturers and the users of Diesel engines. Charles M. Schwab, Past-President of the Society, who was scheduled to speak, was unable to attend but sent to the banquet a message of regret and greeting. Dean Sackett presented to the Division a special gavel made of Pennsylvania walnut by college students.

The meeting closed on Saturday afternoon with a picnic in the mountains at Colerain Forge, near Spruce Creek.

In addition to the entertainment program already outlined, there were several events for the ladies, including a tea at the home of Mrs. J. W. Henszey on Thursday, and an all-day excursion in the mountains. Nearly thirty ladies attended the meeting.

Excellent facilities for golf, tennis, and other sports were available.

The program for the technical sessions follows. A resolution was passed at the Research Session on Friday afternoon asking the Division to appoint a sub-committee to secure a consensus of opinion from manufacturers and users of Diesel engines and oil refiners on Diesel-fuel-oil specifications.

Thursday, June 14

General Session

Address of Welcome, Ralph D. Hetzel.
European Diesel-Engine Developments, Oliver F. Allen.

Economics

The Economic Field for Small and Medium Size Diesel Engines, H. A. Pratt.
The Economic Field for Large Diesel Engines, Edward B. Pollister.
The Diesel Engine and the Public Utilities, Roswell H. Ward.

Friday, June 15

Conference on Diesel-Fuel-Oil Specifications

Diesel-Fuel-Oil Specifications, G. H. MICHLER.

Research

Cooperative Diesel-Engine Research, HARTE COOKE.
Oil Spray Research at Penn State, P. H. SCHWEITZER.
Aeronautical Research at 20,000 Photographs a Second. *Film by Japanese Aeronautical Institute.*

Saturday, June 16

Symposium on Specialization in Oil Engine Manufacture

Specialization in Manufacturing Diesels, O. D. TREIBER.
Manufacture of Diesel Fuel Injectors, C. R. ALDEN.

Printing Industries Division

Rochester, N. Y., November 8-9, 1928

The second National Meeting of the Printing Industries Division, held at Rochester on November 8 and 9, 1928, drew an attendance of over 150, with members and guests from as far west as the Mississippi River, and from twelve states. The meeting was held under the auspices of the Rochester Section and with the cooperation of the Rochester Engineering Society. Headquarters were at the Hotel Sagamore.

PLANT INSPECTIONS

The second afternoon of the meeting was spent in inspection of various plants, the largest group going to the Stecher Lithographic Co. and Kodak Park. Other plants visited were the Bausch and Lomb Optical Works, the Smith Printing Co., the Hurst Engraving Co., the H. H. Sullivan Co., and the fine new plant of the daily newspaper *Times Union.*

FRIDAY EVENING DINNER

The meeting was closed with a dinner Friday evening at the Sagamore Hotel Roof Garden at which E. P. Hulse, Chairman of the Division, was toastmaster, and Roy Snyder, of the *Times Union,* Chairman. Wm. C. Glass, former Chairman and organizer of the Division, gave a short talk on its foundation and objects and was followed by R. W. Disque, general manager of the *Democrat Chronicle,* who gave an address on " The Spirit of the Creative Age," describing mechanical development and progress in the newspaper field. Dean Dexter S. Kimball of Cornell University spoke on industrial development and its effect on the younger generation. Mr. Hulse then announced the appointment by President Dow of Geo. C. Van Vechten of Rochester as the new member of the Executive Committee of the Division for a five-year term. The dinner closed with the showing of the Japanese high-speed motion-picture film.

Thursday, November 8

Color Reproduction

Photography as Used in Color Reproduction in Graphic Arts, A. J. Newton.

The Standardization of Colored Printing Inks and Its Advantages, Taylor W. Ansted.

Lithographing and Bronzing

The Field of Lithograph Printing, George C. Van Vechten.

Modern Bronzing Problems and Methods, William C. Glass.

Educational Session

The Visagraph, How the Blind May Recognize Printed Letters, Robert E. Naumburg, assisted by Toivo Laminan, graduate of Perkins Institute for the Blind.

Friday, November 9

Imposition and Color Proofing

The Art of Photo Composing, or Photomechanical Imposition, William C. Huebner.

The Relation of Proofing to Color Printing with Respect to Accuracy and Color Results, L. W. Claybourn.

Textile Division

Boston, Mass., May 22, 1928

The first National Meeting of the Textile Division was held at the Statler Hotel in Boston on May 22, 1928, under the auspices of the Boston Section, and was attended by nearly two hundred engineers and guests coming from twelve states.

Three papers were presented at a technical session in the morning, as follows:

Increasing the Production of Cotton Padders, Reynolds Longfield.

The Value of Water for Textile Mills for Purposes Other Than Water Power, Chas. T. Main.

The Comparative Performance of Looms with Plain and Roller Bearings, George H. Perkins.

In the afternoon over 125 took advantage of the inspection trip to Salem to see the Naumkeag Steam Cotton Company plant which exhibits the most modern type of plant layout, coupled with efficient operation of machinery and methods of manufacturing.

James W. Cox, Jr., Chairman of the Division, was toastmaster at an informal dinner in the evening. P. C. Idell, Chairman of the Boston

Section, gave a brief address of welcome. The principal speakers of the evening and their subjects were as follows:

The Relation of the Engineer to the Textile Industry, Dexter S. Kimball.
Selling Cotton Cloth, Leavelle McCampbell.
"The Naumkeag," J. Foster Smith.

Textile Division

Greenville, S. C., October 17, 1928

Over a hundred engineers attended the second National Meeting of the Textile Division of the Society at Greenville, S. C., on October 17, 1928. This was the first technical textile meeting to be held in the South and aroused much interest, many of those present coming from as far away as upper New England. With a technical session in the morning, an inspection trip in the afternoon and an evening dinner meeting, the day was given over completely to the technical problems of the textile industry. The meeting was held at the Poinsett Hotel under the auspices of the Greenville Section of the Society.

Technical Session

Three papers were presented at the technical session, as follows:

Comparative Performances of Looms with Plain and Roller Bearings, George H. Perkins.
Recent Advances in Control of Plain, Chase and Schreiner Calendering, James A. Campbell.
Modern Developments in Cotton Mill Opening Equipment, Walter W. Gayle.

Inspection Trip

In the afternoon, members and guests were transported to the Pacific Mills plant at Lyman, S. C., where they had the opportunity of visiting one of the South's most modern plants, manufacturing finishing white sheets and similar fabrics. The entire plant was inspected with its 32,000 spindles, finishing plant, power plant, etc. From the roof of the building an excellent view of the model village for employees which has been built in the last five years was obtained.

Dinner

The dinner meeting in the evening was presided over by James W. Cox, Jr., Chairman of the Division, as toastmaster. He discussed in his opening remarks conditions in the textile industry which made engineering control of processing of vital importance.

The first dinner speaker was J. E. Sirrine, well-known consulting engineer of Greenville, who discussed the development of the Southern textile industry and pointed out that in some of the new industries of the North, high wages and prosperity went together, which he wished would be the case for the South.

Alex Dow, President of the Society, was the last speaker of the evening.

SOUTHERN TEXTILE EXPOSITION

An added feature of the meeting was the Southern Textile Exposition which was in progress the same week in Greenville and which was a splendid exhibition of textile machinery and accessories.

Wood Industries Division

Grand Rapids, Mich., November 26-27, 1928

The Peninsula Section of the Society and the Grand Rapids Engineering Society cooperated with the Wood Industries Division in its third National Meeting, held in Grand Rapids, Mich., November 26 and 27, 1928, with headquarters at the Hotel Pantlind.

DINNER MEETING

Burritt Parks welcomed the guests at an informal dinner meeting on Monday evening and introduced Wm. Braid White, Chairman of the Division, as toastmaster. Mr. White, who has headed the Division for several years, gave a brief résumé of its activities and objects, after which he introduced President Dow, who, unexpectedly, had been able to attend the gathering.

Axel Oxholm, Director of the National Committee on Wood Utilization, was the next speaker and after a short description of the work of his committee called attention to many grave wastes occurring in the wood industries of this country.

Prof. D. M. Mathews, of the University of Michigan, told of his interesting experience in the Far East as a forester and lumber producer. Geo. F. Cosgrove completed the dinner program with an amusing talk on equipment engineering.

It was announced during the dinner that A. S. Kurkjian of Grand Rapids had been appointed on the Executive Committee of the Division for a term of five years.

PLANT INSPECTIONS

The local committee in charge of the meeting furnished transportation to various plants open for inspection on the afternoon of November 27. These plants were those of the American Seating Company, Berkey & Gay Furniture Company, Colonial Furniture Company, Grand Rapids Chair Company, Robert W. Irwin Company, Stow-Davis Furniture Company, John Widdicomb Company, and Widdicomb Furniture Company.

TECHNICAL SESSIONS

The following technical sessions were held:

Monday, November 26

Wood Fuel

Opening Remarks, W. T. RITTER.

Obtaining the Maximum Fuel Value from Wood Waste, E. WINHOLT.

Wood-Burning Furnaces, BURRITT A. PARKS.

Wood Utilization

Engineering Characteristics of Plywood, THOMAS D. PERRY.

Strain Relations in Wood, C. B. NORRIS.

American Markets for Tropical Timbers, H. M. CURRAN.

Tuesday, November 27

Machinery

Reducing Waste by Improvement of Design and Use of Wood Working Saws and Knives. Progress report of Special Research Committee on Saws and Knives. Presented by CARLE M. BIGELOW.

Efficiency Methods and Standards in German Woodworking Industries, ROBERT SCHLUETER.

Automatic Production of Small Wood Parts, I. B. WHINERY.

Steam Generating Apparatus in Forest Areas as Related to Causes of Forest Fires, A. C. COONRADT.

Index to Publications

INDEX TO PUBLICATIONS

THE FOLLOWING PAGES provide a combined index to *Mechanical Engineering* and the sections of Transactions for 1928, with cross references to the codes, standards, bibliographies, and other publications listed below. The combined index, therefore, provides a single source of reference to the technical literature published by the Society during 1928.

Miscellaneous Publications

STANDARDS

Scheme for the Identification of Piping Systems, American Recommended Practice, A 13-1928
Tinners', Coopers' and Belt Rivets, American Standard, B 18g-1928
Round Unslotted Head Bolts, Tentative American Standard, B 18c-1928
Plow Bolts, Tentative American Standard, B 18f-1928
Cast Iron Pipe Flanges and Flanged Fittings, American Standard, B 16a-1928
Cast Iron Pipe Flanges and Flanged Fittings, American Standard, B 16b-1928
Mathematical Symbols, American Standard, Z 10f-1928

RESEARCH PUBLICATIONS

A Bibliography on Woods of the World—Exclusive of the Temperate Region of North America and with Emphasis on Tropical Woods, 1928
A Bibliography on Effect of Temperature on Properties of Metals, 1928

POWER TEST CODES

Test Code for Centrifugal and Rotary Pumps, 1923 Series, February, 1928
Test Code for Steam Turbines, 1923 Series, April, 1928
Part 1, General Considerations, Instruments and Apparatus, 1923 Series, June, 1928
Test Code for Gas Producers, 1923 Series, November, 1928
Part 21, Leakage Measurement, Chapter 1, Condenser Leakage Tests; Instruments and Apparatus, 1923 Series, November, 1928

BOILER CODES

Boiler Construction Codes (Revised Edition), February, 1928

BOOKS

Condensed Catalogues of Mechanical Equipment, 1928-1929, edition, October, 1928
Engineering Index for 1927, April, 1928

Hydraulic Laboratory Practice, Advance copies, December, 1928
John Stevens—An American Record, April, 1928
Principles of Metallurgy of Ferrous Metals (Revised Edition), March, 1928

Society Publications

A.S.M.E. News, semi-monthly
A.S.M.E. Membership List, 1928, February, 1928
A.S.M.E. Record and Index, 1927, June, 1928

Conventions Used in Indexing

Cross references to " p. 187 " and " p. 188 " denote pamphlets and books in the preceding list.

References to *Mechanical Engineering* are denoted by (ME) and give volume and page number. In certain cases other abbreviations are used, as follows:

(BR), Book review
(C), Correspondence
(CT), Conference Table
(D), Discussion
(E), Editorial

These abbreviations precede the reference except where there are several references to one subject, one or more of which necessitates the use of such an abbreviation, in which case the abbreviation immediately precedes the page number; thus, E, ME-50 (729); or ME-50 (441; E, 729).

Sections of Transactions are denoted by the following symbols: AER, Aeronautics; APM, Applied Mechanics; FSP, Fuels and Steam Power; HYD, Hydraulics; IS, Iron and Steel; MAN, Management; MH, Materials Handling; MSP, Machine-Shop Practice; OGP, Oil and Gas Power; PET, Petroleum; PI, Printing Industries; RR, Railroads; TEX, Textiles; WI, Wood Industries.

References to Transactions give section, volume, number of paper, and page; thus, MAN-50-4 (5) refers to Management Section, vol. 50, paper no. 4, page 5. If the reference is to a discussion, the symbol (D) is used as in the case of discussions in *Mechanical Engineering*. No page number is given where an entry refers to an entire paper.

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- ABBOTT, W. L. Recent improvement in the manufacture of flat glass (D), ME-50(780)
  - The high cost of fuel saving (D), FSP-50-4
  - The modern fire engine (D), ME-50(302)
- ABBOTT, W. R. The degree-day method of fuel consumption analysis, PET-50-4
- Abbreviations, scientific and engineering symbols and, ME-50(797)
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Constitution, By-Laws, Rules, and Index

Including the Code of Ethics

CONSTITUTION[1]

Article C1, Name and Government

Sec. 1 The name of this Society is The American Society of Mechanical Engineers.

Sec. 2 The Society is a corporation, organized April 7, 1880, and chartered under the laws of the State of New York, December 23, 1881. A supplemental charter was issued on October 17, 1907, when the Society was consolidated with the Mechanical Engineers' Library Association.

The principal offices of the Society shall be in the City of New York.

Sec. 3 The Society shall be governed by this Constitution, the By-Laws and the Rules.

Article C2, Objects

Sec. 1 The objects of this Society are to promote the art and science of mechanical engineering and the allied arts and sciences; to encourage original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and severally and in cooperation with other engineering and technical societies to broaden the usefulness of the engineering profession.

Article C3, Membership

Sec. 1 The membership shall consist of Honorary Members, Members, Associates, Associate-Members and Juniors.

Sec. 2 The rights and privileges of every member shall be personal to himself and shall not be transferable.

Sec. 3 Each member shall be entitled to vote on any question before any meeting of the Society, or before the Society as a whole.

Sec. 4 Every person admitted to membership shall be subject to the Constitution of the Society, and to any amendments that may be made from time to time.

Article C4, Qualifications for Admission

Sec. 1 Members of all grades shall be elected by the Council.

Sec. 2 An Honorary Member shall be a person of acknowledged professional eminence.

Sec. 3 A Member shall be an engineer, at least thirty-two (32) years of age, who has been in the active practice of his profession, or who has fulfilled the duties of a professor of engineering in a college or school of accepted standing, for at least ten (10) years, and has been in responsible charge of important work for at least five (5) years, and is qualified to design as well as to direct engineering work.

Graduation from a school of engineering of accepted standing shall be considered equivalent to two (2) years of active practice.

Sec. 4 An Associate need not be an engineer, but must have had such responsible connection with some branch of engineering, science, the arts, or industries, that the Council will consider him qualified to cooperate with engineers in the advancement of professional knowledge, and he must be at least thirty (30) years of age.

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[1] Revised to April 1, 1929, and including the Code of Ethics.

Sec. 5 An Associate-Member shall be an engineer, at least twenty-seven (27) years of age, who has been in the active practice of his profession, or who has fulfilled the duties of a professor of engineering in a college or school of accepted standing, for at least six (6) years, and has been in responsible charge of work for at least two (2) years.

Graduation from a school of engineering of accepted standing shall be considered equivalent to two (2) years of active practice.

Sec. 6 A Junior must have had such engineering experience as will enable him to fill a subordinate position in engineering work, or he must be a graduate of an engineering school of accepted standing. He must be at least twenty-one (21) years of age, and his connection with the Society shall cease when he becomes thirty-five (35) years of age, unless he has been previously transferred to another grade.[1]

Article C5, Fees and Dues

Sec. 1 The initiation fee for membership in each grade shall be:

Member	$ 25
Associate	25
Associate-Member	25
Junior	10
Promotion from Junior to a higher grade	15

Sec. 2 The annual dues for membership in each grade shall be:

Member	$ 20
Associate	20
Associate-Member	20
Junior, for the first six (6) years of his membership	10
Junior, after six (6) years	20

Sec. 3 The Council may permit any Member, Associate, or Associate-Member to become a Life-Member in the same grade, as provided in the By-Laws.

Sec. 4 The Council may remit the dues of any member for any special reason, as provided in the By-Laws.

Article C6, Nominating Committees

Sec. 1 The membership of the Society shall elect annually a Regular Nominating Committee, whose duty shall be to select candidates for the elective offices to be filled at each annual election, as provided in the By-Laws.

Sec. 2 Other nominating committees having the same powers may be constituted by the membership of the Society, as provided in the By-Laws.

Article C7, Directors (Council) and Officers

Sec. 1 The affairs of the Society shall be managed by a Board of Directors, chosen from its membership and styled "The Council."

Sec. 2 The Directors of the Society shall consist of a President, seven (7) Vice-Presidents, nine (9) Managers, and the last five (5) surviving Past-Presidents.

Sec. 3 The Directors shall be elected at the Annual Meeting of the Society, on the first Tuesday in December, as provided in the Charter.

The election shall be by sealed letter-ballot of the membership, as detailed in the By-Laws.

Sec. 4 The President shall be elected for one (1) year, the Vice-Presidents for two (2) years, the Managers for three (3) years.

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[1] Inclusive of Junior Member elections from December, 1922.

Sec. 5 The Officers of the Society shall consist of the President, the Vice-Presidents and the Treasurer.

Sec. 6 At its first meeting after the Annual Meeting of the Society the Council shall appoint a member of the Society to serve as Treasurer for one (1) year.

The Treasurer shall perform the duties usually pertaining to this office, in accordance with the By-Laws and Rules, and such further duties as may be required by the Council.

Any vacancy in the office of Treasurer shall be filled by appointment by the Council.

Sec. 7 The Directors may at any time, whenever sufficient cause shall appear to them, delegate to any member of the Society the performance of any duties required by the Constitution to be performed by any Director or by the Secretary.

Article C8, Council

Sec. 1 The Council shall have full control of the activities of the Society, subject to the limitations of the Constitution.

Sec. 2 The Council shall have power to fill vacancies in its membership by appointment until the next election, as provided in the By-Laws, except that the office of president shall be filled by the vice-president who is senior by age.

Sec. 3 The number of members constituting a quorum of the Council shall be as determined in the By-Laws.

Sec. 4 The Council shall present at the Annual Meeting of the Society a report verified by the president or treasurer or by twelve (12) members of the Council, showing the whole amount of real and personal property owned by the Society, where located, and where and how invested, and the amount and nature of the property acquired during the year immediately preceding the date of the report, and the manner of the acquisition; the amount applied, appropriated or expended during the year immediately preceding such date, and the purpose, object or persons to or for which such applications, appropriations, or expenditures have been made; also the names and places of residence of the persons who have been admitted into membership in the Society during the year.

The report shall be filed with the records of the Society, and an abstract shall be entered in the minutes of the proceedings of the Annual Meeting of the Society.

Article C9, Meetings of the Society

Sec. 1 The Annual Meeting of the Society shall be held at such time and place as the Council shall appoint, provided it begins in the City of New York and continues there during the annual election of directors, held on the first Tuesday in December.

Sec. 2 The Semi-Annual Meeting of the Society shall be held at such time and place as the Council shall appoint, as provided in the By-Laws.

Sec. 3 A Special Meeting of the Society may be called at any time and place at the discretion of the Council, or shall be called by the Council upon the written request of at least one (1) per cent of the membership.

The call for the meeting shall be issued at least thirty (30) days prior to the date set for it, and shall state the business to be considered. No other business shall be transacted at the meeting.

Sec. 4 The number of members constituting a quorum at any Meeting of the Society shall be as determined by the By-Laws.

Sec. 5 An action of a Meeting of the Society shall be deemed an action of the Society as a whole. Any expenditure required by such action is subject to approval and authorization by the Council.

Article C10, Professional Divisions

SEC. 1 The Council may authorize the organization of Professional Divisions composed of members of any or all grades, which shall operate under the provisions of the Constitution, By-Laws and Rules.

Article C11, Local Sections

SEC. 1 The Council may authorize the organization of Local Sections composed of members of any or all grades, which shall operate under the provisions of the Constitution, By-Laws and Rules.

Article C12, Publications and Papers

SEC. 1 The papers and publications of the Society shall be issued in such manner as the Council may direct.

Article C13, Secretary

SEC. 1 At its first meeting after the Annual Meeting of the Society the Council shall appoint a member of the Society to serve as Secretary for one (1) year.

SEC. 2 The Secretary shall perform the duties usually pertaining to this office, in accordance with the By-Laws and Rules, and such further duties as may be required by the Council.

SEC. 3 Any vacancy in the office of Secretary shall be filled by appointment by the Council.

Article C14, Funds

SEC. 1 The deposit, investment and disbursement of all funds shall be subject to the direction of the Council.

Article C15, Professional Practice

SEC. 1 In all professional and business relations the members of the Society shall be governed by the Code of Ethics incorporated in the By-Laws.

SEC. 2 Any member who has violated the Constitution of the Society, or who is guilty of conduct rendering him unfit to remain a member, may be expelled by the vote of fifteen (15) members of the Council, after he has been given opportunity to be heard in his own defense.

SEC. 3 The Society may approve or adopt any report, standard, code, formula, or recommended practice.

SEC. 4 The Society shall forbid and oppose the use of its name or initials in any commercial work or business, except to indicate conformity with its standards or recommended practices, in accordance with the By-Laws and Rules.

Article C16, Amendments to the Constitution

SEC. 1 At any Meeting of the Society, any person entitled to vote may propose in writing an amendment to this Constitution, provided that it shall bear the written indorsement of at least one (1) per cent of the membership.

Such proposed amendment shall not be voted on for adoption at that meeting, but shall be open to discussion and modification, and to a vote as to whether, in its original or modified form, it shall be mailed in printed form to the members of the Society for action.

If the members present at the meeting, not less than twenty (20) voting in favor thereof, shall so decide, then the Secretary shall mail in printed form to each person entitled to vote, at least sixty (60) days previous to the next Meeting of the Society, a copy of the proposed amendment as so decided by said vote, accompanied by any comment the Council may elect to make.

A ballot shall be sent with the proposed amendment, and the voting shall be by sealed letter-ballot, closing at noon of the twentieth (20th) day preceding the Meeting of the Society following the mailing.

The ballots shall be voted, canvassed and announced as provided in the By-Laws.

The adoption of the amendment shall be decided by a majority of the votes cast.

The presiding officer at the meeting of the Society following the close of the ballot shall announce the result, and if the amendment is adopted it shall thereupon take effect.

SEC. 2 Any changes in the order or numbering of articles or sections of the Constitution required by an amendment shall be made under the direction of the Council.

SEC. 3 This Constitution shall supersede all previous rules of the Society, and shall go into effect upon the adjournment of the meeting of the Society at which the presiding officer announces its adoption.

BY-LAWS

Article B1, Government

PAR. 1 At any regular meeting, the Council may, by a two-thirds vote of its members present, adopt or amend By-Laws in harmony with the Constitution, provided that such By-Laws or amendments shall have been submitted in writing at a previous meeting of the Council and the Secretary has mailed a copy to each member of the Council at least fifteen (15) days before the meeting at which action is to be taken. A By-Law or an amendment to a By-Law shall take effect immediately upon its adoption by the Council, and shall be published at once by the Secretary to all members of the Society.

PAR. 2 At any regular meeting, by a majority vote of its members present, the Council may adopt or amend Rules in harmony with the Constitution and the By-Laws. A Rule or an amendment shall take effect immediately upon its adoption by the Council, and shall be published by the Secretary to all the members of the Society.

PAR. 3 Any changes in the order or numbering of By-Laws or Rules made necessary by the adoption of amendments shall be made under the direction of the Council.

PAR. 4 Every question which shall come before a meeting of the Society or of the Council or of a committee, shall be decided by a majority of the votes cast, unless otherwise provided in the Constitution, the By-Laws and the Rules, or by the laws of the State of New York.

PAR. 5 The Rules contained in "Robert's Rules of Order Revised" shall govern the Society in all cases to which they are applicable, when not inconsistent with the By-Laws or the Rules of this Society.

Article B2, Objects

PAR. 1 The principal means for accomplishing the object of the Society shall include:

(*a*) Holding meetings for reading and discussing professional papers and for personal interchange of knowledge and views.

(*b*) Issuing publications.

(*c*) Investigating and reporting upon subjects of engineering interest.

(*d*) Promulgating reports, standards, codes, formulas and recommended practices.

(*e*) Encouraging affiliation of students of engineering with this Society.

(*f*) Contributing to the maintenance of the Engineering Societies Library, of which the Library of this Society is a part.

(*g*) Participating, as provided in the Rules, in joint movements with bodies having the same objects as this Society, and cooperating with affiliated societies having like purposes.

PAR. 2 The policy of the Society shall be to give papers read before it the widest publicity.

PAR. 3 The Society shall not be responsible for statements or opinions advanced in papers or in discussion at meetings of the Society or of its Divisions or Sections, or printed in its publications.

PAR. 4 The Society reserves the right to copyright, at the discretion of the Council, any of its papers, discussions, reports or publications.

Article B3, Membership

PAR. 1 The Honorary Members shall not at any time exceed twenty-five (25) in number.

PAR. 2 In accordance with the Rules, a proxy may be given to a member entitled to vote, but shall not be valid for more than six (6) months.

PAR. 3. Proffered resignations shall be presented to the Council for action, and shall be accepted if the requirements of the Rules have been met.

Article B4, Qualifications for Admission

PAR. 1 A candidate for admission to the Society in any grade, except Honorary Membership, or a member desiring to change his grade, shall make application to the Council on an approved form, as detailed in the Rules.

PAR. 2 Fifteen (15) affirmative votes of the Council shall be required for the election of a candidate for any grade except Honorary Membership. Two (2) negative votes shall defeat an election.

PAR. 3 Each approved candidate shall be assigned by the Council to the grade of membership to which, in its judgment, his qualifications entitle him.

PAR. 4 Nomination for Honorary Membership may be made to the Council by at least twenty-five (25) members of the Society, who shall in all cases state in writing the grounds upon which the nomination is made.

PAR. 5 Election to Honorary Membership shall be by letter-ballot of the Council. Ballots shall be mailed by the Secretary to each member of the Council at least sixty (60) days in advance of the date set for the closure of such election. One (1) negative vote shall defeat an election to Honorary Membership.

PAR. 6 All matters relating to membership shall be in charge of the Standing Committee on Membership, under the direction of the Council.

Article B5, Fees and Dues

PAR. 1 The initiation fee and that part of the annual dues from the first month following the date of election to the first day of October, shall be due and payable on the first day of the month following the date of election. Only upon the payment of this amount shall the person elected be entitled to the rights and privileges of membership in the grade to which he is assigned. If such person does not comply with this requirement within three (3) months after notice of his election, the Council may declare his election void.

PAR. 2 The annual dues for each ensuing year shall be due and payable in advance on the first day of October.

PAR. 3 A member whose dues shall remain unpaid for three (3) months shall in the discretion of the Council not be entitled to the publications until his dues are paid.

PAR. 4 A member whose dues shall remain unpaid for twelve (12) months, shall, in the discretion of the Council, be stricken from the roll of membership and shall cease to have any further rights as a member.

PAR. 5 A bill for annual dues shall be mailed to each member by October 1 of each year. Notice of arrears shall be sent thereafter, as directed by the Council.

PAR. 6 At its first meeting in the calendar year the Secretary shall submit to the Council a list of the delinquents for action thereon in respect to their right to vote and receive the publications.

PAR. 7 At its first meeting after the close of the fiscal year on September thirtieth, the Secretary shall submit to the Council a list of delinquents for its action thereon in respect to their continuance on the rolls of the Society and retaining rights as members.

PAR. 8 If, in the case of non-payment of dues, the right to receive the publications of the Society or to vote be questioned, the books of the Society shall be conclusive evidence.

PAR. 9 A member may become a life member by paying the Society at one time an amount sufficient to purchase from an insurance company, satisfactory to the Finance Committee, an annuity equal to that member's dues (a) for his life expectation or (b) for the term for which he is required to pay dues in accordance with the Constitution, By-Laws and Rules.

PAR. 10 For distinguished service to the Society, the Council may confer life membership upon any member. Proposal for such action must be made at a regular meeting of the Council. Immediately following that meeting, the Secretary shall send to the members of the Council a letter-ballot upon the proposal, this ballot to close in sixty (60) days. Fifteen (15) affirmative votes shall be required to approve and one (1) dissenting vote shall disapprove such proposal.

PAR. 11 As detailed in the Rules, the Council may, for sufficient cause, temporarily excuse from payment of annual dues, any member who from ill health, advanced age or good reason assigned is unable to pay such dues; and the Council may remit the whole or part of dues in arrears, or accept in lieu thereof desirable additions to the Library, or collections.

PAR. 12 The Council may restore to membership any person dropped from the rolls for non-payment of dues or otherwise, upon such conditions as it may deem best.

Article B6, Nominating Committees

PAR. 1 The Regular Nominating Committee of the Society shall consist of seven (7) members with seven (7) alternates elected at the Annual Meeting, as detailed in the Rules. The Chairman of the outgoing Nominating Committee shall serve as an advisory member, without vote, and the Secretary of the outgoing Committee may serve as alternate for him.

PAR. 2 The members and alternates of the Regular Nominating Committee shall be elected for one (1) year, and no member or alternate shall be eligible for more than two (2) consecutive terms. Serving as an alternate shall not affect the eligibility of a member to serve on the committee for two (2) terms, if elected.

PAR. 3 The names of those elected to serve on the Regular Nominating Committee shall be published by the Secretary by the first week in February of each year, accompanied by a request for suggestions for nominees.

PAR. 4 A vacancy in a Regular Nominating Committee of the Society shall be filled by the alternate for that vacancy, or failing that, shall be filled by the Council.

PAR. 5 A Special Nominating Committee may be organized by any group of one (1) per cent of the membership of the Society in good standing certifying to the Secretary in writing their joint intention to organize such a Committee.

Article B7, Directors (Council) and Officers

(Nomination, Qualifications and Election)

PAR. 1 Within two weeks following the Semi-Annual Meeting, the Regular Nominating Committee shall deliver to the Secretary in writing the names of its nominees for the elective offices to be filled at the next election, together with the written consents of the nominees.

PAR. 2 The names and qualifications of nominees for the various offices proposed by the Regular Nominating Committee, shall be published by the Secretary immediately after the receipt of the report of the Nominating Committee.

Par. 3 Candidates for the office of President and Vice-President shall be of the grade of Member of the Society. Candidates for all other elective offices may be of any grade of membership.

Par. 4 Names of any nominees presented by any Special Nominating Committee must be in the hands of the Secretary by the first Tuesday in August of each year, and must be accompanied by the written consent of each nominee.

Par. 5 On or before the third Thursday in August of each year, the Secretary shall mail to each member entitled to vote a ballot stating the names of the candidates for the elective offices to be filled at the next election, as detailed in the Rules.

Par. 6 Voting for the election of Directors shall close at the City of New York at 10 o'clock in the forenoon on the fourth Tuesday in September in each year, and the ballots shall be canvassed, as detailed in the Rules.

Par. 7 On or before the third Thursday in August of each year, the President shall appoint three (3) Tellers of Election of Directors, whose duty it shall be to canvass the votes cast, as detailed in the Rules. The term of office of the Tellers shall expire when their report of the canvass has been presented and accepted.

Par. 8 By the first day of October, the Secretary shall notify the candidates having the greatest number of votes for their respective offices.

Par. 9 The Directors shall be declared elected by the presiding officer at the Annual Meeting of the Society in December, and their terms of office shall begin on the adjournment of the Annual Meeting.

Par. 10 If a tie occurs in the vote for any officer, the presiding officer at the Annual Meetings shall cast the deciding vote.

Par. 11 In the election of the Vice-Presidents, three (3) shall be elected every other year and four (4) the alternate years, to serve for two (2) years.

Par. 12 In the election of the Managers, three (3) shall be elected each year to serve for three (3) years.

Par. 13 A member in office shall not be eligible for immediate reelection to office at the expiration of the term for which he was elected, except the Treasurer. The restriction in this paragraph shall not apply to the Secretary, who is not an Officer or Director.

Par. 14 Members in office shall continue in their respective offices until their successors have been elected or appointed, and have acceptel their offices.

Par. 15 The President shall perform the duties regularly or customarily attaching to his office under the laws of the State of New York, and such other duties as may be required of him by the Council or the By-Laws.

Par. 16 In the absence of the President his duties shall be performed by the Vice-President then present, senior by length of membership in the Society, or in his absence or any other disability, by any other member of the Council designated by the Executive Committee or by the Council.

Par. 17 The Treasurer shall be the legal custodian of all funds of the Society. The investment of all trust funds and of other permanent or temporary investment of funds shall be made by the Treasurer with the approval of the Finance Committee.

The Treasurer shall take part in the deliberations of Council, but shall have no vote therein.

Par. 18 In the absence of the Treasurer his duties shall be performed by any other officer of the Society designated by the Council or by the Executive Committee.

Article B8, Council

PAR. 1 The Council shall consider the failure of any incumbent, from inability or otherwise, to perform the duties of his office, and may by a two-thirds vote, decree any elective office vacant. The Council shall thereupon appoint a member to fill the vacancy until the next election of officers, except for the office of the President, which shall be filled by the Vice-President who is senior by age. Such appointment shall not render the appointee ineligible for election to any office.

PAR. 2 A quorum of the Council shall consist of eight (8) members.

PAR. 3 An act of the Council which shall have received the expressed or implied sanction of the membership at the following meeting of the Society, shall be deemed to be an act of the Society and cannot afterwards be impeached by any member.

PAR. 4 The Council may order the submission of any question to the membership for decision by letter-ballot. The Council may appoint Tellers to canvass such a ballot, as detailed in the Rules. The result of such a ballot shall be binding when confirmed by formal action of the Council.

COMMITTEES, ETC., APPOINTED BY THE COUNCIL

PAR. 5 The Council shall, at its first meeting of each year, appoint from among its members an Executive Committee of not less than three nor more than seven members. The junior past-president shall be an ex-officio member of the Executive Committee. During the interval between sessions of the Council the Executive Committee shall have and exercise all the general powers of the Council, except power to fill vacancies in the Council or to amend the By-Laws. The Secretary may take part in the deliberations of the Executive Committee, without vote.

The Executive Committee shall keep minutes of its proceedings which shall be reported in each case at the next subsequent meeting of the Council.

PAR. 6 Upon the recommendation of a Meeting of the Society or upon its own initiative, the Council shall have the power to appoint, as it may deem desirable, an Administrative Committee to assist in the conduct of the affairs of the Society. Any proposed expenditure of such a committee must be authorized by the Council before it is incurred.

PAR. 7 Upon the recommendation of a Meeting of the Society or upon its own initiative, the Council shall have power to appoint, as it may deem desirable, any Professional Committee to investigate and report upon a subject of engineering interest, except that the procedure of the American Standards Association shall be followed in organizing Sectional Committees. (See Paragraphs 42 to 44 of this Article). Any proposed expenditure of such a committee must be authorized by the Council before it is incurred.

PAR. 8 Administrative and Professional Committees shall be standing or special, as the By-Laws and Rules provide and the Council approves. The Chairmen of Standing Committees shall be entitled to a seat in the Council, but no vote. The term of office of one (1) member of each Standing Committee shall expire at the close of each Annual Meeting.

PAR. 9 Each committee shall perform the duties required by the By-Laws and Rules, or assigned to it by the Council.

PAR. 10 The Council may terminate membership on any committee on account of continued absence of the member, from inability or otherwise.

PAR. 11 The President shall appoint a member to fill each vacancy in the Standing Committees, as detailed in the Rules.

PAR. 12 Each committee shall at its first meeting elect a Chairman to serve for one (1) year.

PAR. 13 A member of a Standing Committee whose term of office has expired, shall continue to serve until his successor has been elected or appointed.

PAR. 14 On or before the fifteenth day of October of each year, each Standing Committee shall deliver to the Secretary a written report of its work for presentation to the Council, as detailed and tabulated in the Rules. The Council may embody such report in its Annual Report presented to the Society in accordance with the Constitution.

PAR. 15 Reports of Special Committees shall follow the procedure detailed in the Rules.

Also, on or before the fifteenth day of October of each year, each Special Committee shall deliver a written progress report to the Secretary for presentation to the Council. Upon receipt of this report, the Council may, in its discretion, continue the committee.

The committee shall be discharged upon the adoption of the final report.

ADMINISTRATIVE COMMITTEES

PAR. 16 The Standing Committee on Finance shall, under the direction of the Council, have supervision of the financial affairs of the Society, including the books of account, as prescribed in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members of the Society, the term of one (1) member expiring at the close of each Annual Meeting, and two (2) members of the Council, the term of one (1) member expiring at the close of each Annual Meeting.

PAR. 17 The Standing Committee on Meetings and Program shall, under the direction of the Council, have supervision of the Meetings of the Society, except Special Meetings, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 18 The Standing Committee on Publications shall, under the direction of the Council, have supervision of the publications of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 19 The Standing Committee on Membership shall receive and scrutinize all applications for membership and report to each meeting of the Council the names of the candidates under consideration, together with the recommendations of the Committee on each, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member expire at the close of each Annual Meeting. Any member of the Council in office shall be entitled to attend meetings of the Membership Committee and to vote therein.

PAR. 20 The Standing Committee on Professional Divisions shall, under the direction of the Council, have supervision of the Professional Divisions of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 21 The Standing Committee on Local Sections shall, under the direction of the Council, have supervision of the Local Sections of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 22 The Standing Committee on Constitution and By-Laws shall, under the direction of the Council, have supervision of matters affecting the Constitution, By-Laws and Rules, and shall report on all matters in this connection referred to it by Council. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 23 The Standing Committee on Awards shall, under the direction of the Council, have supervision of the awards of the Society as detailed in the Rules or prescribed by Council. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 24 The Standing Committee on Relations with Colleges shall, under the direction of the Council, have supervision of the Student Branches of the Society and of such work of the Society as aims to further the education of engineers through the colleges and schools of accepted standing. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 25 The Standing Committee on Education and Training for the Industries shall, under the direction of the Council, have supervision of such work of the Society as deals with education and training for the industries through agencies other than the colleges and engineering schools. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 26 There shall be a Standing Committee on Library, which shall represent the Society on the Library Board of the United Engineering Society. The functions of this Committee shall be as detailed in the Rules. The number of members of this Committee and their terms of office shall be as required by the by-laws of the United Engineering Society.

PROFESSIONAL COMMITTEES

PAR. 27 The Standing Committee on Standardization shall advise the Council on the dimensional standardization work of the Society, including relations with the American Standards Association, as detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 28 The Standing Committee on Research shall advise the Council on the research work of the Society, as detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 29 The Standing Committee on Safety shall advise the Council on the activities of the Society having to do with engineering and industrial safety, except the activities of the Boiler Code Committee, for which special provision is made. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 30 The Special Committee on Boiler Code shall, under the direction of the Council, have supervision of all the activities of the Society in connection with the A. S. M. E. Codes for Pressure Vessels, including the interpretations of these codes, as detailed in the Rules. The Committee shall be appointed by the President and confirmed by the Council, and the President shall fill all vacancies in the Committee.

PAR. 31 The Standing Committee on Power Test Codes shall, under the direction of the Council, have supervision of all the activities of the Society in connection with the A. S. M. E. Power Test Codes, including the interpretations of such codes, as detailed in the Rules. The Committee shall consist of twenty-five (25) members and the terms of five (5) members shall expire at the close of each Annual Meeting.

PAR. 32 The Standing Committee on Professional Conduct shall, under the direction of the Council, have supervision of all matters relating to the Code of Ethics and its enforcement, as required by the Constitution, and as detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

SOCIETY REPRESENTATION

PAR. 33 The Council may, in its discretion, appoint a member or members, or other person or persons, to represent it at meetings of societies of kindred aim or at public functions. Such delegates shall be designated as "Honorary Vice-Presidents," and their duties shall terminate with the occasion for which they are appointed.

PAR. 34 The President, subject to the approval of the Council, may nominate or appoint a member or members, or other person or persons, to represent the Society on professional or other committees organized by other societies or by Government departments or bureaus, or otherwise.

PAR. 35 The Council shall elect three (3) Trustees to serve on the Board of Trustees of the United Engineering Society, as required in the by-laws of that body.

PAR. 36 As provided in the By-Laws and Rules, the Society shall elect delegates to serve under the direction of the Council on the American Engineering Council, as required in the by-laws of that body. If the number of delegates required to serve is at variance with the number elected or in office, the Council is empowered to make any adjustments necessary.

PAR. 37 The Council shall designate the Standing Committee on Library to serve as the Society's representatives on the Library Board of the United Engineering Society, as required in the by-laws of that body.

PAR. 38 The Council shall nominate to the United Engineering Society two (2) Members of the Society to serve on the Engineering Foundation Board as required in the by-laws of that body.

PAR. 39 The Council shall appoint four (4) members to represent the Society on the John Fritz Medal Board of Award, as required in the by-laws of that body.

PAR. 40 The Council shall appoint two (2) members of the Society to serve on the Committee on Washington Award of the Western Society of Engineers, as required in the by-laws of that body.

PAR. 41 The Council shall nominate three (3) members to represent the Society on the Division of Engineering of the National Research Council, as required in the by-laws of that body.

AMERICAN STANDARDS ASSOCIATION

PAR. 42 The Council shall designate three (3) members to represent the Society on the American Standards Association, as required by the Constitution of that body.

PAR. 43 The representatives of the Society on the Sectional Committees for which the Society is sponsor or joint sponsor, organized under the rules of the American Standards Association, shall be appointed by the President, subject to the approval of the Council.

PAR. 44 The representatives of the Society on a Sectional Committee for which the Society is not sponsor, organized under the rules of the American Standards Association, shall be appointed by the President, subject to the approval of the Council.

Article B9, Meetings of the Society

PAR. 1 An Annual Meeting may be adjourned to any other city than the City of New York upon the recommendation of the Committee on Meetings and Program, and upon authorization by the Council.

PAR. 2 A Semi-Annual (Spring) Meeting shall be held in any place only upon the recommendation of the Committee on Local Sections, confirmed by the Committee on Meetings and Program, and authorized by the Council at its regular meeting at the previous Semi-Annual Meeting.

Par. 3 At the Annual Meeting of the Society, sixty (60) persons entitled to vote shall constitute a quorum for the transaction of business.

Par. 4 At the Semi-Annual Meeting of the Society, fifty (50) persons entitled to vote shall constitute a quorum for the transaction of business.

Par. 5 At a Special Meeting of the Society, fifty (50) persons entitled to vote shall constitute a quorum for the transaction of business.

Par. 6 Any Meeting of the Society at which a quorum is present may order the submission of any question to the membership for letter-ballot, and the result, if affirmative, shall be binding upon being confirmed by the next meeting of the Society.

Par. 7 Announcement of all Meetings of the Society shall be made by the Secretary, as detailed in the Rules.

Par. 8 All Meetings of the Society, except special meetings, shall be in charge of the Committee on Meetings and Program, under the direction of the Council.

Par. 9 Papers submitted or solicited for Meetings of the Society shall be subject to the Rules detailed under Publications and Papers, Article R12.

Par. 10 Following the completion of the preliminary arrangements, the Committee on Meetings and Program shall assume charge of the Regional Meetings, as detailed in the Rules governing Local Sections.

Article B10, Professional Divisions

Par. 1 The object of each Professional Division shall be to provide, through an organization of members of any or all grades particularly interested in a branch of engineering included in the scope of the Society's activities, means for promoting the arts and sciences of that branch.

Par. 2 A member in any grade may register in not more than three Professional Divisions upon a written application to the Secretary of the Society.

Par. 3 A Professional Division of the Society may be organized upon acceptance by the Council of the written request of a satisfactory number of members. Such a Division shall be designated as the . . . . . Division of The American Society of Mechanical Engineers.

Par. 4 The provisions of the Constitution, By-Laws and Rules of the Society shall cover the procedure of all Professional Divisions, but no action or obligation of a Division shall be considered an action or obligation of the Society as a whole. This By-Law shall be imprinted on any publication issued by a Division.

Par. 5 For the convenient conduct of its affairs, each Professional Division shall organize an Executive Committee, as detailed in the Rules. The Executive Committee shall elect its Chairman each year, and upon confirmation by the Council, he shall serve as Chairman of the Division.

Par. 6 The function of the Standing Committee on Professional Divisions, under the direction of the Council, shall be to organize, foster and coordinate Professional Divisions and their activities as detailed in the Rules.

Professional Groups

Par. 7 In case the number of members interested in a particular branch of the Society's work is not large enough to warrant the formation of a full Professional Division under the provisions of the By-Laws, the Council may authorize the formation of a Professional Group, and will itself appoint an Executive Committee to organize such a Group, and will designate the Chairman of the Committee. When a sufficient number of members become attached to this Group, it may petition for reorganization into a Professional Division.

Article B11, Local Sections

PAR. 1 The object of a Local Section of the Society shall be to provide means for promoting the work of the Society by a local organization of members who are resident within a given territory.

PAR. 2 A Local Section shall consist of members of any or all grades and of other persons, as provided in the Rules.

PAR. 3 A Local Section of the Society may be organized upon acceptance by the Council of the written request of a satisfactory number of members. Such a Section shall be designated as the . . . . . . Section of The American Society of Mechanical Engineers.

PAR. 4 The provisions of the Constitution, By-Laws and Rules of the Society shall cover the procedure of all Local Sections, but no action or obligation of a Section shall be considered an action or obligation of the Society as a whole. This By-Law shall be imprinted on any publication issued by the Section.

PAR. 5 For the convenient conduct of its affairs, each Section shall organize an Executive Committee, as detailed in the Rules.

PAR. 6 A Regional Meeting of several Local Sections may be held in any place upon the recommendation of the Committee on Local Sections confirmed by the Committee on Meetings and Program and authorized by the Council at any regular meeting. The principal objects of Regional Meetings are to provide, with the Semi-Annual Meeting, an annual series of meetings throughout the country, and also to develop the initiative of the Local Sections by placing responsibility upon them for the inauguration and conduct of technical meetings. The conduct of a Regional Meeting shall be as specified in the Rules. No Regional Meeting shall be considered a Meeting of the Society as a whole.

PAR. 7 The affairs of the Local Sections shall be in general charge of the Standing Committee on Local Sections, under the direction of the Council. This Committee shall be constituted as provided elsewhere in the By-Laws.

Article B12, Publications and Papers

PAR. 1 All publications of the Society shall be in charge of the Standing Committee on Publications, under the direction of the Council. All income from and expenditures for publications and all policies in regard to publications shall be controlled by the Council.

PAR. 2 The Record and Index issued each year shall contain the annual report of the Council, an index of the technical papers and discussions and reports of the technical committees and other records of Society activity selected by the Committee on Publications.

PAR. 3 Each member of the Society in good standing on the thirty-first day of December of each year shall be entitled to receive a copy of the Record and Index for that year.

PAR. 4 The Transactions of the Society shall be issued in sections corresponding with the Professional Divisions. Members registered in the Professional Divisions will receive the Transactions of the Divisions in which they are registered.

PAR. 5 *Mechanical Engineering* shall be issued monthly and shall be mailed regularly to each member in good standing.

PAR. 6 *A. S. M. E. News* shall be issued semi-monthly and shall be mailed regularly to each member in good standing.

PAR. 7 The Membership List shall be issued to each member in good standing who makes request for it.

PAR. 8 Papers presented to the Society and papers solicited by any of the committees shall be subject to the procedure specified in the Rules.

Article B13, Secretary

Par. 1 The Secretary of the Society shall be the Secretary of the Council and of each of the committees.

Par. 2 The Secretary may take part in the deliberations of the Council, but shall have no vote therein.

Par. 3 The office of the Secretary shall be open for business, as the Rules prescribe.

Par. 4 The Secretary may be subject to removal for cause by a vote of fifteen (15) members of the Council at any time, after one (1) month's written notice has been given him to show cause why he should not be removed, and after he has been heard in his own defense, if he so desires.

Par. 5 The Secretary shall receive a salary which shall be fixed by the Council.

Article B14, Funds

Receipts

Par. 1 All funds shall be paid in to the Secretary, who shall enter them in the books of the Society, and deposit them to the account of the Treasurer in a bank designated by the Council.

Par. 2 All bills against members and others shall be made and collected by the Secretary.

Par. 3 All initiation fees shall upon receipt be deposited in the Reserve Account of the Society, and current expenses shall not be paid out of such Reserves without reference to the Finance Committee and its recommendations to the Council.

Par. 4 All contributions to the Society for any specific purpose shall be disbursed under the direction of the Council.

Par. 5 All registration fees collected at Meetings of the Society shall be paid into the general funds and be disbursed under the direction of the Council.

Par. 6 All gifts or bequests not designated for a specific purpose shall be invested by the Council, and only the income used as directed by the Council.

Par. 7 All gifts or bequests to the Society designated by the donors for a specific purpose, and all moneys permanently set aside by the Council for specific purposes, shall be invested and either the capital or income as so designated shall be used for that specific purpose for which it was designated.

Par. 8 In the case of all moneys invested by the Council for permanent or temporary purposes, the Secretary of the Society shall at the close of each fiscal year compute the interest and return received for the year on the Society's invested funds. The Secretary shall determine an average rate of income and shall recommend an apportionment of such return to each of the several funds for which investment is made. Upon approval and order of the Council these apportioned returns shall be duly entered in the books of account of the Society as the income for the year on the various funds.

Par. 9 At the discretion of the Council income from any fund may be allowed to accumulate for expenditure in any subsequent year, or the income may be added to the original fund and invested with it. But, in no case may the Council expend moneys from such specially designated funds, either from capital or from income duly apportioned as detailed in paragraph 8, for the current expenses of the Society.

Par. 10 Upon the maturity of any permanent investment other than trust funds, the Treasurer and Finance Committee are required to reinvest such funds unless instructed and authorized to the contrary by the Council.

Par. 11 The securities of the Society, either principal or trust funds, may be sold, bought, or exchanged upon the written order of the Treasurer, the

Secretary, and the Chairman of the Finance Committee, and these three signatures must appear on any order to any broker, bank, or company. If any one or two of these officers be temporarily unavailable, then an equal number of members of the Executive Committee may be substituted.

EXPENDITURES

PAR. 12 All expenditures shall be subject to the approval of Council and shall be made in accordance with the annual budget of appropriations as finally adopted by the Council at the beginning of each fiscal year, as provided in the Rules.

PAR. 13 Any obligations which may be incurred during the fiscal year and which will require the expenditure of the Society's funds outside of appropriations made by the Council in the approved annual budget shall first be referred to the Finance Committee for report by that Committee back to the Council.

PAR. 14 The Secretary shall report to the Council each month the total obligations incurred against each appropriation, together with the amount of each appropriation which is unexpended.

PAR. 15 The annual appropriations approved by the Council, or so much thereof as may be required for the work of the Society, shall be expended by the Secretary, under direction of the committees.

PAR. 16. All bills against the Society shall be in charge of the Secretary who shall present them in proper form to the Finance Committee for audit, as provided in the Rules.

PAR. 17 Funds of the Society shall be paid out only upon vouchers duly signed by the Secretary and audited by the Finance Committee under the direction of the Council.

Article B15, Professional Practice

PAR. 1 All members of the Society shall subscribe to the following Code of Ethics, as required by the Constitution:

A CODE OF ETHICS FOR ENGINEERS

Engineering work has become an increasingly important factor in the progress of civilization and in the welfare of the community. The engineering profession is held responsible for the planning, construction and operation of such work and is entitled to the position and authority which will enable it to discharge this responsibility and to render effective service to humanity.

That the dignity of their chosen profession may be maintained, it is the duty of all engineers to conduct themselves according to the principles of the following Code of Ethics:

1 The Engineer will carry on his professional work in a spirit of fairness to employees and contractors, fidelity to clients and employers, loyalty to his country and devotion to high ideals of courtesy and personal honor.

2 He will refrain from associating himself with or allowing the use of his name by an enterprise of questionable character.

3 He will advertise only in a dignified manner, being careful to avoid misleading statements.

4 He will regard as confidential any information obtained by him as to the business affairs and technical methods or processes of a client or employer.

5 He will inform a client or employer of any business connections, interests or affiliations which might influence his judgment or impair the disinterested quality of his services.

6 He will refrain from using any improper or questionable methods of soliciting professional work and will decline to pay or to accept commissions for securing such work.

7 He will accept compensation, financial or otherwise, for a particular service, from one (1) source only, except with the full knowledge and consent of all interested parties.

8 He will not use unfair means to win professional advancement or to injure the chances of another engineer to secure and hold employment.

9 He will cooperate in upholding the Engineering Profession by exchanging general information and experience with his fellow engineers and students of engineering and also by contributing to the work of engineering societies, schools of applied science and the technical press.

10 He will interest himself in the public welfare in behalf of which he will be ready to apply his special knowledge, skill and training for the use and benefit of mankind.

Article B16, Amendments to the Constitution

Par. 1 At least fourteen (14) days before the closing of a ballot on an amendment to the Constitution, the President shall appoint three (3) Tellers of Election on Amendments, whose duty it shall be to canvass the votes cast, as detailed in the Rules.

Par. 2 The Tellers shall canvass the ballots and shall certify the result to the Presiding Officer at the Meeting of the Society at which the result is to be announced.

Par. 3 In the case of a tie vote on an amendment, the Presiding Officer at the Meeting of the Society shall cast the deciding vote.

Par. 4 The terms of office of the Tellers shall expire when their report of the canvass has been presented and accepted.

RULES

Article R2, Objects

Rule 1 The Council may approve the affiliation with the Society of any engineering society or legally organized group of engineers whose objects are in accord with the traditions, precedents and objects of this Society.

Rule 2 The term "Affiliated with The American Society of Mechanical Engineers" shall be used by any society or by individual members of it only while the respective governing boards of both societies continue the affiliation.

Rule 3 Affiliation with this Society of any other organization shall in no wise be interpreted as interfering with the independence, autonomy and self-control of that organization under its own Constitution or By-Laws.

Rule 4 The Society shall not be responsible for any act of any affiliated society.

Rule 5 Affiliation with this Society of any other organization may be terminated by the governing board of either giving sixty (60) days' written notice to the governing board of the other.

Article R3, Membership

Rule 1 Each member shall be entitled to a certificate of membership, signed by the President and Secretary of the Society; it shall remain the property of the Society and be returned on demand. Each member requesting a certificate shall pay the cost of engrossing.

Rule 2 Each proxy authorizing a person to vote for a member shall be signed, with an attesting witness, by the member giving it and submitted to the Secretary for verification of the right of the member to vote at the meeting at which the proxy is to be used.

Rule 3 Abbreviations of the titles to be used by members are as follows:

Honorary Member	Hon. Mem. A. S. M. E.
Member	Mem. A. S. M. E.
Associate	Assoc. A. S. M. E.
Associate-Member	Assoc-Mem. A. S. M. E.
Junior	Jun. A. S. M. E.

Rule 4 The emblem approved by the Council for each grade of membership shall be used only by those who belong to that grade.

Rule 5 Each resignation presented to the Council after the fiscal year has commenced (October first) must be accompanied by a statement from the Secretary that the member has paid his dues up to and including that portion of the current fiscal year, unless such resignation is presented by January first, when no payment of current dues shall be required.

Rule 6 Each member desiring to resign shall deposit with the Secretary any badge and certificate of membership in his possession, and upon acceptance of his resignation the Secretary shall make him the stipulated refund for his badge.

Article R4, Qualifications for Admission

Rule 1 A candidate for admission to the Society as a Member, Associate or Associate-Member must refer to at least five (5) members who have personal knowledge of his qualifications.

RULE 2 A candidate for admission to the Society as a Junior must refer to at least three (3) members who have personal knowledge of his qualifications.

RULE 3 An application for membership from a candidate who may not be able to give the necessary number of references may be recommended to the Council for ballot after sufficient evidence has been secured to show that the candidate is worthy of admission to membership. Such candidates may refer to officers or voting members of other societies of like standing.

RULE 4 Each application may be referred by the Membership Committee to the Executive Committee of the Local Section to which the applicant would be logically attached, for information and comment by such Local Committee. If, after a period of twenty (20) days no comment is received from the Local Committee, the Membership Committee will proceed with the consideration of the application.

RULE 5 The references for each candidate shall be requested to make such confidential communications to the Membership Committee as will enable it to arrive at a proper estimate of the eligibility of the candidate.

RULE 6 The Membership Committee shall report to each session of the Council the names of all candidates together with the recommendation of the Committee on each. The Committee shall meet monthly to receive and scrutinize all applications, and shall seek further information as to the qualifications of a candidate whose evidence of eligibility is not clear to them.

RULE 7 The Membership Committee shall at once destroy all correspondence in relation to each candidate when his name has been placed on ballot by order of the Council, or upon the withdrawal of the application.

RULE 8 The Secretary shall mail to each member of the Council a ballot of the names and respective grades of the candidates for membership approved by the Membership Committee after having been duly posted in the publications of the Society. The voter shall prepare his ballot by crossing out the name of any candidate rejected by him, and shall enclose the ballot in an envelope and seal it. He shall enclose this envelope in a second envelope and sign it for identification. A ballot without the autographic endorsement of the voter on the outer envelope is defective and shall be rejected.

RULE 9 The Secretary shall count the ballots cast by the Council for election of new members, notify the applicants of their election, and regularly report the results of the ballot at the Council meeting next following each election. The names of applicants who are not elected shall neither be announced nor recorded.

Article R5, Fees and Dues

RULE 1 A Student Associate making application for membership within one (1) year of the date of his graduation shall be excused by the Council from the payment of dues for one (1) year from the date of election.

RULE 2 In accordance with B5, Par. 11, the Council shall permanently exempt from dues any member of the Society who has paid dues for thirty-five (35) years, or who shall have reached the age of seventy (70) years after having paid dues for thirty (30) years.

Article R6, Nominating Committees

RULE 1 For the purpose of nominating members of the Regular Nominating Committee, the Committee on Local Sections shall, on or before the first day of October of each year, associate the Local Sections into seven (7) groups, each group to be responsible for nominating one (1) member of the Committee. The Sections which will comprise these groups shall, as far as possible, be contiguous geographically to each other.

RULE 2 The assignment of the Local Sections to such groups shall be announced at the Conference of Local Sections Delegates held at the Annual Meeting.

Rule 3 Each member of the Society entitled to vote shall be assigned to one of the seven (7) groups of Local Sections for the purpose of the election of the Regular Nominating Committee.

Rule 4 Each Local Section, except as quoted in Rule 5, shall be entitled to one (1) delegate to the Conference of Local Sections Delegates for the purpose of the selection of the Regular Nominating Committee, and shall be entitled to one (1) vote in the Conference in the selection of the member of the Committee nominated to represent its group of Sections.

Rule 5 In a case in which a Local Section is divided into branches, the Section shall not have a delegate, but each branch shall be entitled to a delegate with one (1) vote.

Rule 6 At the time of the announcement of the groups the Chairman of the Committee on Local Sections shall designate one (1) member of each group to call it together for organization. The result of the actions taken by the groups shall be submitted to the Conference of Local Sections Delegates for action.

Rule 7 The Chairman of the Committee on Local Sections, or in his absence, the senior member of the Committee, shall preside at the Conference of Local Sections Delegates at the time action is taken on the Regular Nominating Committee.

Rule 8 At the Business Session of the Annual Meeting of the Society, the Chairman of the Local Sections Conference shall present names recommended by the Conference for the Regular Nominating Committee.

Article R7, Directors (Council)

Rule 1 The names of the candidates proposed by the Regular Nominating Committee and by any other nominating committee, and the respective offices for which they are candidates, shall be printed in separate lists on the same ballot sheet, each list of candidates to be printed under the names of the members of the particular committee which proposed it.

Rule 2 Each list of names shall contain the name of only one (1) candidate for the office of President. For any other office than President, there may be more than one (1) candidate.

Rule 3 In the election of Directors, the voter shall prepare his ballot by crossing out the name of any candidate or candidates rejected by him and may write in the name of any eligible member of the Society, and shall enclose the ballot in an envelope and seal it. He shall then enclose this envelope in a second envelope marked " Ballot for Directors " and seal it, and he shall then write his name thereon for identification.

Rule 4 The Tellers shall not receive any ballot after the stated time for the closure of the voting.

Rule 5 The Secretary shall certify to the competency and signature of all voters.

Rule 6 The Tellers shall open and destroy the outer envelopes and then open the inner envelopes and canvass the results.

Rule 7 A ballot without the autographic endorsement of the voter on the outside envelope is defective and shall be rejected by the Tellers of Election.

Rule 8 A ballot containing more names than there are offices to be filled is defective and shall be rejected by the Tellers.

Rule 9 In counting the ballots for officers, the Tellers shall consider a ballot for any officer as valid providing the intent of the voter as to that particular office is clear, even though his ballot as to candidates for another office may for any reason be invalid.

Article R8, Council

REPORTS OF STANDING ADMINISTRATIVE COMMITTEES

RULE 1 Table of procedure for reports.

STANDING COMMITTEES

Finance; Meetings and Program; Publications; Membership; Professional Divisions; Local Sections; Constitution and By-Laws; Awards; Relations with Colleges; Education and Training for the Industries; Library.

These are always Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

SPECIAL COUNCIL COMMITTEES

Any Special Committee the Council may appoint.

Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report, and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

Final Reports:

Two (2) copies submitted to Secretary of Society, one (1) copy signed by members of committee with or without reservations.

Manifolded and mailed to Council for examination previous to call for vote.

At next meeting, Council votes to receive report, incorporate it in its own records, and discharge committee with thanks.

Presented to Society at following Business Meeting (Annual or Spring).

Submitted to Publications Committee for printing in the Records and Index and/or publication in pamphlet form for general distribution.

REPORTS OF STANDING PROFESSIONAL COMMITTEES

RULE 2 Table of procedure for reports.

STANDING COMMITTEES

Research; Standardization, Power Test Codes—Main Committee; Safety; Professional Conduct.

These are always Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

SPECIAL COMMITTEES

Research Committees (Bearing Metals, Lubrication, Flow Meters, and the like); Boiler Code; Power Test Codes—Individual Committees.

Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report, and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

A. S. M. E. Special Committees—Final Reports:

Two (2) copies submitted to Secretary of Society, one (1) copy signed by committee, with or without reservations.

Manifolded and mailed to selected list, including Council, for criticism and suggestions.

Referred back to Committee for consideration of criticism and suggestions.

Revised copy submitted to Executive Committee of Council for examination, with letter-ballot.

Executive Committee of Council may vote (1) to receive it without printing, (2) refer it back to committee.

If voted by Executive Committee, it is printed in *Mechanical Engineering* for criticism and suggestions.

Presented for discussion at Business Meeting of Society or at public hearing. This open discussion must be fully advertised and a general invitation to attend extended to all persons and recognized organizations affected.

Written discussion from above carefully considered by Committee and report again revised if necessary.

Final draft submitted to any other committees of Council concerned for review and recommendations to Council if necessary.

Submitted to Council, with letter-ballot, for final approval and adoption as to form and substance.

Submitted to Publications Committee for printing in the Record and Index and/or publication in pamphlet form for general distribution.

A. S. A. Sectional Committees—Final Reports:

Twelve (12) copies submitted to Secretary of Society, one (1) copy signed by Sectional Committee, with or without reservations.

Mailed to A. S. M. E. Standardization Committee, for study and recommendations to Executive Committee of Council.

Mailed to Executive Committee of Council for examination, with letter-ballot.

Executive Committee of Council may vote (1) to receive it for A. S. M. E., (2) order its printing in *Mechanical Engineering* in full or abstract.

If voted by Executive Committee, it is printed in *Mechanical Engineering* for criticism and suggestions.

Reprints mailed to interested
(1) organizations
(2) firms
(3) individuals
with request for criticism and suggestions.

At the discretion of the A. S. M. E. Standardization Committee, public hearings may also be arranged.

Returned to Sectional Committee with the criticisms and suggestions.

Sectional Committee votes on revised draft, and submits two (2) copies to each sponsor, with a complete record of the vote.

Copies of revised report, standard or code, mailed to every member of Council, with letter-ballot.

On approval by Council and governing boards of other sponsors, it is submitted to A. S. A. for approval as an American Standard or Tentative American Standard.

Reprinted in pamphlet form for sale by A. S. A. and the sponsors. Latter provide fifty (50) copies for free distribution to other standardizing bodies.

Article R8 (*cont.*)

AMERICAN ENGINEERING COUNCIL

RULE 3 The President of the Society in office shall be the Chairman of the delegation of this Society to the meetings of the American Engineering Council, and the chairman of the A. S. M. E. representatives on the Executive Board.

Article R9, Meetings of the Society

RULE 1 Announcements of all Meetings of the Society shall be made in the publications. A notice of each meeting shall be given by the Secretary to each member not less than thirty (30) days before the date of that meeting.

RULE 2 The conduct of the professional and business sessions at any Meeting of the Society shall be in charge of presiding officers and assisting committees, appointed by the Meetings and Program Committee with the advice and consent of the President.

RULE 3 The features of the program outside of the professional and business sessions at any Meeting of the Society in any city shall be in charge of a committee appointed or designated by the Committee on Meetings and Program.

RULE 4 At the opening of every meeting the Chairman shall announce the definite amount of time allotted by the Committee on Meetings and Program for the presentation and discussion of each paper.

Article R10, Professional Divisions

RULE 1 When a number of members of the Society interested in a particular branch of the work of the Society favor the formation of a Professional Division for that branch, they may draw up a petition for the establishment of such a Division. Each such petition shall be sent to the Standing Committee on Professional Divisions for presentation to the Council with its recommendation. Upon approval of the petition by the Council, the Chairman of the Standing Committee on Professional Divisions shall appoint a temporary Chairman of the new Division.

RULE 2 The Executive Committee of each Professional Division shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting. Such officers as the Division may require shall be selected from the membership of the Society. Other committees of the Division shall be appointed by the Executive Committee as required.

RULE 3 Upon the organization of a Professional Division the initial selection of the Executive Committee shall be made by the President upon the nomination of the Standing Committee on Professional Divisions which will state the length of term of each appointee.

RULE 4 During the month of October of each year the Executive Committee of each Division will nominate to the President through the Standing Committee on Professional Divisions one or more individuals from whom the President shall appoint the member of the Executive Committee.

Rule 5 The Executive Committee of each Professional Division shall elect its own officers. No one shall be eligible for chairmanship until he has been a member of this committee for one year, except in the selection of the Executive Committee for a newly formed Division.

Rule 6 In case of resignation or decease, vacancies shall be filled by appointment of the Executive Committee subject to the approval of the President of the Society.

Rule 7 The Executive Committee may, subject to the approval of the Secretary of the Society, appoint or elect a Secretary of the Division, who shall report the proceedings of that Division to the Secretary of the Society for notice in the publications. He shall perform the duties of Secretary of the Division, and such other duties as may be prescribed by the Executive Committee.

Rule 8 Any expenditure for the purpose of a Division chargeable to the Society must be authorized by the Secretary of the Society before it is incurred, and must be provided for in the annual budget approved by the Council. Any liability otherwise incurred shall not be binding on the Society, and must be met by the Division itself.

Rule 9 Notice of all Professional Division meetings shall be given in writing to the Secretary of the Society and to the Chairman of the Standing Committee on Professional Divisions at least six (6) weeks in advance of the date set for such meetings.

Professional Groups

Rule 10 The functions and responsibilities of a Professional Group shall be the same as those of a Professional Division, except that the Chairman of the Executive Committee, although having a seat in the conferences of the Chairmen of the Professional Divisions, shall have no vote.

Rule 11 The activities of a Professional Group shall be subject to the jurisdiction of the Standing Committee on Professional Divisions.

Rule 12 The Council reserves the right to disband any Professional Group on sixty (60) days' notice.

Article R11, Local Sections

Rule 1 When a number of members of the Society in any territory within the limits of North America, Hawaii, Porto Rico, and Cuba favor the formation of a Local Section in that territory, a preliminary meeting shall be called and notice sent to the entire membership of the Society residing in that territory. At this meeting a petition for the formation of a Local Section, containing suggestions as to the territory to be included in the Section, may be presented, and if adopted, shall be sent to the Standing Committee on Local Sections for recommendation to the Council.

Rule 2 Upon the approval by the Council of the petition, a meeting of the signers shall be held for the selection of a temporary Executive Committee of at least five (5) members. This Committee shall have charge of, and be responsible for, the proceedings of the Local Section until the next election of officers.

Rule 3 The Executive Committee of a Local Section shall consist of a Chairman, a Secretary, and such other officers as may be found desirable. Such officers shall be elected by ballot of the members of the Society constituting the Section. The Committee shall be elected before the first day of June each year and shall take office on the first day of July.

Rule 4 A member of the Society shall be entitled to vote or to hold office in not more than one (1) Local Section at a time.

Rule 5 The Chairman of each Local Section shall have the privilege of attending all meetings of the Standing Committee on Local Sections.

Rule 6 The Secretary of each Local Section shall report the proceedings of that Section to the Secretary of the Society for notice in the publications. He shall discharge the duties of Secretary of the Section, and such other responsibilities as may be prescribed by the Executive Committee.

Rule 7 Any expenditure chargeable to the Society for the purpose of any Local Section must be provided for in the annual budget approved by the Council. No liability otherwise incurred shall be binding upon the Society.

Rule 8 Each Local Section shall have the privilege of representation at the Annual Meeting of the Society by one (1) official delegate. Such delegate, the Chairman, if possible, may have such portion of his expenses for transportation to the meeting refunded by the Society as the Committee on Local Sections may direct.

Rule 9 Each Local Section shall use only such uniform stationery as is supplied by the Secretary of the Society.

Rule 10 For the convenient cooperation between the Local Sections and the Professional Divisions, each Local Section may appoint an individual or a committee to act as a correspondent with each Professional Division, with duties that will comprise generally the arranging with the Professional Division for the presentation of papers, holding of meetings, etc., within that particular Local Section, and as far as possible, to act as a means of furnishing information, secured within the Local Section, which might prove of interest to the Division.

Rule 11 A Local Section may affiliate with existing local engineering organizations, or form jointly with them new local engineering organizations, but the plan of such affiliation or organization, and the obligations assumed by the Local Section and the Society thereby, shall first be approved by the Council. Any expenditures incurred in such an affiliation shall be binding only on the Section and not on the Society as a whole.

Rule 12 A Local Section may arrange to hold joint meetings with other engineering organizations and may invite members of such organizations to attend its meetings, but all expenses incurred shall be binding only on the Section and not on the Society as a whole.

Rule 13 Each Local Section may adopt its own by-laws, for the conduct of its affairs, provided such are in harmony with the Constitution, By-Laws and Rules of the Society, and provided also every publication of such by-laws be prefaced with a copy of this Rule.

Rule 14 The Council of the Society, on sixty (60) days' notice, may suspend or disband any Local Section.

Rule 15 Groups of members residing outside the limits of North America, Hawaii, Porto Rico, and Cuba may engage in group activities with local members of the A. S. C. E., A. I. M. E., and A. I. E. E., in which case the Council may grant them nominal financial support, provided such group action is not in conflict with the policies and activities of any established national engineering societies in such foreign countries, and that such groups cooperate as permitted with such foreign societies.

Regional Meetings

Rule 16 A Regional Meeting may be held upon petition to the Council of a group of Local Sections. Such a petition must bear the signatures of the Chairman or their representatives on the Executive Committees of the Local Sections proposing to participate in the meeting.

Rule 17 The principal means for accomplishing the object of Regional Meetings shall be the presentation and discussion of technical papers; industrial visits, excursions and entertainments may also be provided.

Rule 18 The plan of procedure for organizing and conducting a Regional Meeting shall be as determined from time to time by the Standing Committees on Local Sections and on Meetings and Program, which shall jointly make recommendations to the Council on all matters affecting Regional Meetings.

Rule 19 The place of a Regional Meeting shall be determined by the Council upon the concurrent recommendation of the Standing Committees on Local Sections and on Meetings and Program.

Rule 20 Following the completion of the preliminary arrangements, each Regional Meeting shall be under the jurisdiction of the Committee on Meetings and Program. The Local Sections participating in the meeting shall appoint a special local committee to conduct the meeting, which committee shall act as a sub-committee of the Committee on Meetings and Program.

Rule 21 Papers for presentation at Regional Meetings are subject to the rules governing presentation of papers before the Society, enumerated elsewhere in the Rules.

Rule 22 Notice of a Regional Meeting shall be published by the Secretary of the Society at least six (6) weeks in advance of the date of the meeting.

Rule 23 Cooperation with other national and local engineering societies in a Regional Meeting shall be encouraged. Preliminary arrangements for such cooperation shall be made through the Standing Committee on Local Sections, but official conclusions of any preliminary arrangements must be made by the respective secretaries of the national and local societies participating.

Rule 24 No Regional Meeting shall be considered as a Meeting of the Society as a whole, and no business of the Society may be transacted at such a meeting.

Student Branches, Associate Student Societies, and Enrolled Students

Rule 25 A group of students in an Engineering School may petition the Council for the formation of a Student Branch of the Society if the Engineering School conforms to the following requirements:

(*a*) A preparation for entrance of four (4) years at high school or its equivalent.

(*b*) An adequate staff for teaching mechanical engineering.

(*c*) At least one (1) member of the faculty a member of The American Society of Mechanical Engineers.

(*d*) An equipment of buildings and laboratories sufficient to make possible a responsible professional course in mechanical engineering.

(*e*) A course of studies covering all subjects ordinarily required to enable a graduate to begin a career in engineering. Members of Student Branches shall be known as Student Associates.

Rule 26 (*a*) A group of Student Associates interested in mechanical engineering may petition the Council for the formation of a Student Branch of the Society. [Heretofore, fifteen (15) has been the usual minimum number in such a group] or

(*b*) Established Student Engineering Societies in schools or colleges of accepted standing may petition the Council for association with the Society. Mechanical engineering students in such Societies shall also be regarded as Student Associates of the Society.

Rule 27 An application for a Student Branch, or an association by a Student Engineering Society, must be made to the Secretary of the Society. Such applications will be referred to the Standing Committee on Relations with Colleges, and by it reported to the Council for final action. The application should indicate clearly the number of teachers of mechanical engineering, the laboratory facilities, in a general way, and the number of mechanical engineering students. A catalogue of the college should accompany the application.

Rule 28 The name of a Student Branch affiliated with the Society shall be the . . . . . Student Branch of The American Society of Mechanical Engineers.

Rule 29 Each Student Branch shall be autonomous, subject to such limitation as may be set by the Constitution, By-Laws and Rules of the Society, and the Council.

Rule 30 So far as practicable, each Student Branch shall, through its secretary, furnish to the Secretary of the Society for notice in the publications, reports of meetings held and business transacted.

Rule 31 Upon recommendation of each Student Branch, the President of the Society shall designate a member of the Society to be Honorary Chairman of the Student Branch for each year. The Honorary Chairman shall be *ex-officio* a member of the governing body of the Student Branch.

Rule 32 The presiding officer chosen by each Student Branch shall be styled the Chairman of the . . . . . . Student Branch of The American Society of Mechanical Engineers.

Rule 33 The Committee under whose management the affairs of the Student Branch are conducted shall have at least three (3) members in addition to the Honorary Chairman. The names shall be communicated to the Secretary of the Society.

Rule 34 The names of committees of the Student Branches and papers or stationery must bear the words " Student Branch."

Rule 35 Any Student Branch may have printing done by the Society at cost. In case a Student Branch desires to publish any papers in local journals or elsewhere, it should first ascertain that the Society does not itself desire to publish such paper. The privilege of priority in publication shall always be the right of the Society. The Student Branch shall claim no exclusive copyright.

Rule 36 A Student Associate is entitled to the publications of the Society at special rates, as prescribed in the Rules for Papers and Publications.

Rule 37 With a view to assisting graduates in getting acquainted and to enable them without financial burden to secure benefits of the technical meetings of the Society, a member of a Student Branch will upon graduation be enrolled without additional payment as a member of any Local Section of the Society.

Rule 38 The affairs of the Student Branches shall be in general charge of the Standing Committee on Relations with Colleges, in accordance with the By-Laws.

Rule 39 (*a*) Any person registered as a student in a University or Technical School, complying with stipulations of Rule 25 and pursuing a regular course of study in Mechanical Engineering therein, may be enrolled as an Enrolled Student of The American Society of Mechanical Engineers as hereinafter provided.

(*b*) Application for admission as an Enrolled Student of the Society in those colleges where no student branch has been formed shall be made on a regular form approved by Council. This application shall set forth the age and place of birth of the applicant, the year in which he entered and will complete his college course, and the degree to which such course leads, together with a statement of any experience which he may have had during the summer vacations or otherwise. It should bear the endorsement of at least one member of the faculty, preferably one who is a member of the A. S. M. E. or another engineering society of standing.

(*c*) These applications shall be forwarded to the Headquarters of the Society and passed upon by the Committee on Relations with Colleges.

Rule 40 Each Enrolled Student shall pay an annual fee of $2.50, payable in advance. The period of Student enrollment shall not exceed three years, nor shall it extend more than one and one-half years beyond the date of graduation from, or of leaving the University or Technical School; the period of enrollment shall date from the first of January nearest the date of filing application.

RULE 41 The annual fee of $2.50 paid by each enrolled student shall be applied as a subscription to *Mechanical Engineering* for the year covered by such payment.

Article R12, Publications and Papers

RULE 1

(*A*) The annual subscription price for *Mechanical Engineering* is:

[1] Member	$ 3.00
Member (additional subscription)	4.00
Non-Member in United States	5.00
Non-Member in Canada	5.75
Non-Member in other Foreign Countries	6.50
Library	4.00
Student Associate	2.50
Enrolled Student	2.50

(*B*) The annual subscription price for Transactions as published in sections is:

[1] Member, for three sections	$ 2.00
Non-Member, for each section except Aeronautics, and Fuels and Steam Power	4.00
Non-Member, for Aeronautics Section	5.00
Non-Member, for Fuels and Steam Power Section	8.00

PAPERS

RULE 2 Papers may come to the Society:

(*a*) By voluntary submission by members or non-members.

(*b*) As a result of request of (1) the Standing Committee on Meetings and Program; (2) the Standing Committee on Professional Divisions or a Professional Division; (3) the Standing Committee on Local Sections or a Local Section.

RULE 3 Voluntary papers are classified as those suitable for presentation: (1) at a meeting of the Society, either before a general session or a Profsional Division session; (2) at a Regional Meeting; (3) before a Local Section.

RULE 4 All voluntary papers must be sent to the Secretary of the Society, and be submitted by him to the Standing Committee on Meetings and Program. Such papers may be either accepted for presentation at a general session of the Society; referred to the Standing Committee on Professional Divisions; referred to the Standing Committee on Local Sections; or returned to the Secretary for transmission to the author with or without suggestions for modifications and re-submission.

RULE 5 Papers referred to the Standing Committees on Professional Divisions or on Local Sections may be accepted by these committees and referred to a Professional Division, a committee on a Regional Meeting, or a Local Section, for assignment to a session, or, if such assignment cannot be arranged, may be returned to the Secretary for transmission to the author.

RULE 6 Requested papers will in general be suitable for the purpose for which they have been sought, but all such papers intended for presentation at an Annual or Spring Meeting of the Society must be passed upon by the Standing Committee on Meetings and Program.

RULE 7 Papers requiring advance distribution may be turned over to the Standing Committee on Publications for consideration for advance publication in *Mechanical Engineering;* such copies as are required for distribution may be printed in pamphlet form and an abstract, approved by the Standing Committee on Publications, published in *Mechanical Engineering.*

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[1] For members the subscription price is included in the annual dues.

Rule 8 Papers requiring discussion at a meeting to determine their value and general interest may be accepted for presentation, but shall not be put in type until they have been read and discussed.

Rule 9 All papers accepted for presentation at a Meeting of the Society shall be passed to the Standing Committee on Publications so that, if desired, publication of papers in full or in abstract may be made in *Mechanical Engineering*. Papers may be presented before Regional or Local Section meetings without being passed upon by the Standing Committee on Meetings and Program or referred to the Committee on Publications, but should be sent to those committees afterwards so that they may be available for presentation at a Meeting of the Society or for publication in *Mechanical Engineering,* if such is desirable. Such papers may be given general release to the technical press after presentation under such release date as will permit of simultaneous publication in *Mechanical Engineering*. If prompt publication in *Mechanical Engineering* is not possible, full release will be given to the technical press by the Standing Committee on Publications.

Rule 10 Papers for presentation at the Annual or Spring Meetings of the Society must be received by the Secretary at the headquarters of the Society at least two (2) months before the date of the meeting at which they are to be presented.

Rule 11 Papers presented at any Meeting of the Society, a Professional Division, a Local Section or a Regional Meeting become the property of the Society and fall under the copyright rule, but may be reprinted by anyone, in part or in full, if the proper credit is given to the author and to the Society.

Rule 12 The Standing Committee on Meetings and Program shall deliver to the Secretary such papers as are selected for presentation to the professional or general sessions of the Society, and he shall have sole possession of papers and illustrations between the time of their approval by the Committee and their presentation to the session.

Rule 13 Members may obtain reprints of papers at a price sufficient to cover the cost to the Society, provided that such copies are not for the purpose of resale. Reprints of papers shall bear the imprint of the Society only.

Article R13, Secretary

Rule 1 The office of the Secretary shall be open on business days from 9 a. m. to 5 p. m.; on Saturdays from 9 a. m. to 1 p. m.

Rule 2 The Secretary shall establish and enforce rules for the conduct of the business of his office.

Rule 3 The Secretary shall have charge of the rooms of the Society and furnishings, the historical relics and objects of art, and shall make suitable recommendations to the Council for their care and use.

Article R14, Funds

Rule 1 The accounts of the Society shall be audited and approved annually by a chartered or other competent public accountant.

Rule 2 The Finance Committee shall hold monthly meetings for the auditing of bills and such other business as shall come before it.

Rule 3 Each year the Finance Committee shall present with its report a detailed estimate of the probable income and expenditures of the Society for the following twelve (12) months.

Rule 4 The Finance Committee shall make recommendations to the Council as to investments, and when called upon by the Council, shall advise upon financial questions.

Rule 5 Any contract or other obligations to pay money in the Society's work, exceeding in amount two hundred dollars ($200), shall be valid only when signed by the Secretary.

Article R15, Professional Practice

Rule 1 The Standing Committee on Professional Conduct, having in charge all matters connected with the Code of Ethics and its enforcement, shall cooperate with similar committees of such other societies as adopt the Code, with the object of carrying out the following procedure:

(*a*) The President of each society cooperating in the Joint Code of Ethics shall appoint a Standing Committee on Professional Conduct to administer the Code of Ethics. The duties of such a Committee shall be to interpret the Code and to render opinions on any cases of questionable conduct on the part of members that may be submitted to the Committee. These interpretations shall be reported to the executive board of the society, which board may approve these interpretations or take such other action as may seem just and necessary. The reports of the Committee on Professional Conduct, when approved by the executive board, shall be printed in abstract and in anonymous form in the Society's monthly Journal for the instruction and guidance of fellow members.

(*b*) This Committee on Professional Conduct shall be appointed in each society by the President holding office at the time of the adoption of this Code and shall consist of five (5) members, one (1) appointed for five (5) years, one (1) for four (4) years, a third for three (3) years, a fourth for two (2) years, and a fifth member for one (1) year only. Thereafter, the President then holding office shall appoint one (1) member annually to serve for five (5) years, and shall also fill any vacancies that may occur for the unexpired term of the member who has withdrawn. These appointments shall be made from among the older members of the Society, so that advantage may be taken of their mature experience and judgment. After appointment, the Committee shall elect its own chairman and secretary. The Committee shall have power to secure evidence or other information in any particular case not only from the organizations' own members, but if it should seem desirable, from men in other professions. The Committee may also appoint sub-committees to consider certain cases when deemed necessary.

(*c*) This Commmittee shall investigate all complaints submitted to it by the Secretary of the Society bearing upon the professional conduct of any member and after the member involved has been given a fair opportunity to be heard, the Committee shall report its findings to the executive board of the Society. This report may suggest certain procedure of the executive board.

(*d*) The executive board of the Society shall have power to act on the recommendation of the Committee on Professional Conduct, either (1) to censure by letter the conduct of the member who has acted contrary to the Code, if the breach is of minor character, or (2) to cause the member's name to be stricken from the roll of the Society.

(*e*) Copies of all reports made by a Committee on Professional Conduct to the executive board of each society shall be furnished to each of the other Committees on Professional Conduct administering the Code. This will keep each Committee advised of the interpretations of other Committees, and in time an extended interpretation of the Code can be written based on the reports of the various Committees on Professional Conduct.

(*f*) As interpretations of the various Committees on Professional Conduct administering this Code may vary at times, it is recommended that the Chairmen of these committees of the various societies be authorized to act as a Joint Committee to review such differing interpretations and to bring them into harmony with one another.

Rule 2 The standing Committee on Professional Conduct shall follow the procedure below in considering cases presented to it:

(*a*) Cases for consideration may be:

(1) An interpretation of the code, or
(2) Rendering an opinion on the questionable conduct of a member of the Society.

(*b*) Cases and complaints are to be submitted to the Committee by the Secretary of the Society. If any cases or complaints come directly to the Committee, the Secretary of the Society is to be notified by the Secretary of the Committee so that records of the former will be complete.

(*c*) Before a case is submitted to the Committee, the Secretary of the Society shall ascertain whether the person against whom a complaint has been made is a member of the Society, and if possible decide whether the case is of such importance as to be passed on by the Committee, or is of a trivial nature.

(*d*) A case may be submitted by the Secretary of the Society either through the Chairman or the Secretary of the Committee, or jointly to each member of the Committee.

(*e*) On receipt of a case the Committee shall decide whether it can best make a finding by correspondence, or by a meeting of the Committee, and whether hearings shall be given to the interested parties.

(*f*) The Committee may appoint sub-committees to consider and report on cases too remote for the main Committee to act upon.

(*g*) All correspondence from members of the Committee should pass through the office of the Chairman or Secretary of the Committee and not be sent direct to the Secretary of the Society. In order to facilitate filing and preparation of reports, a letter should cover only one case or subject.

(*h*) Reports and findings on cases shall be sent by the Chairman or Secretary of the Committee to the Secretary of the Society for consideration by the Executive Committee or Council of the Society, which may approve the findings or take such other action as may seem desirable or necessary.

(*i*) The Committee may, if it so desires, suggest action by the Executive Committee or Council.

(*j*) Under the plan laid down by the Joint Committee on Code of Ethics, the Executive Committee or Council shall have the power on recommendation of Committee, either (1) to censure by letter the conduct of a member who has acted contrary to the Code, if the breach is of a minor character, or (2) to cause the member's name to be stricken from the rolls of the Society.

Article R16, Amendments to the Constitution

RULE 1 In voting on an amendment to the Constitution the voter shall prepare his ballot by crossing out that part of the amendment which he wishes to vote against. He shall then enclose the ballot in an envelope and seal it, and shall enclose this envelope in a second envelope marked "Ballot on Amendment" and seal it, and he shall then write his name thereon for identification.

RULE 2 The Tellers shall not receive any ballot after the stated time for the closure of the voting.

RULE 3 The Secretary shall certify to the competency and signature of all voters.

RULE 4 The Tellers shall open and destroy the outer envelopes and then open the inner envelopes and canvass the results.

RULE 5 A ballot without the autographic endorsement of the voter on the outside envelope is defective and shall be rejected by the Tellers.

RULE 6 The Tellers shall consider a ballot as valid provided the intent of the voter is clear, and provided also that he conforms with the regulations for voting.

Appendices to the Rules

Appendix 1, Research Contributions[1]

By special action of the Council, September 25, 1922, and in accord with B14, Par. 4, funds may be solicited from sources outside the Society for the conduct of research. The special Rules adopted by the Council are:

(*a*) The Council favors and strongly urges the closest possible cooperation with universities and technical schools qualified and equipped to assist in the development and conduct of special research work.

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[1] Adopted by Council, May 29, 1923.

(*b*) Cooperative, not competitive, methods should be worked out with existing research laboratories and activities in other organizations. Such cooperation could take the form of publication of papers and groups of papers where a definite industry desires to bring to the attention of engineers for the development of the industry, any problem or special research, without commercial bias.

(*c*) Each suggested research must be presented, on its individual merit, for approval by the Council, which will in turn refer the matter to the appropriate authority or committee.

(*d*) Specific requests to the Council are to be accompanied with full details of proposed scope, method of solicitation of funds and budget.

(c) No exception shall be made to the Society's being the custodian of all funds, and having complete knowledge and control of the distribution and assignment of such funds, through the Council, with the understanding always that no contributor is to be specially favored on account of any contribution for a research in which he is interested and that such contribution can be received only on the basis of general benefit to the industry.

Appendix 2, Awards and Prizes

" AWARDS " are bestowed by the Society on the recommendation of the Committee on Awards, approved by Council.

" PRIZES " may be established by Professional Divisions, Local Sections, or other agency within the Society.

> NOTE : It is not obligatory on the Society to bestow any award if the character of the paper or inventions considered does not have the distinction that will warrant general recognition by the engineering profession.

1 *Honorary Membership,* only by unanimous vote of the Council, as provided in the Constitution and By-Laws. Candidates for Honorary Membership may be nominated to the Council by not less than twenty-five (25) members. In all cases the grounds upon which the nomination is made must be presented to the Council in writing.

The ordinary procedure in connection with voting upon an Honorary Member is that some member of the Society or a committee submit the name informally to all the members of the Council, not for the purpose of obtaining a final vote, but to ascertain whether the final vote will be unanimous or not. The final vote must be by letter-ballot sent out by the Secretary of the Society and one (1) dissenting vote will be a rejection. It will not be customary to ask for a ballot until after the informal inquiry has been made.

2 *A. S. M. E. Medal,* for distinguished service in engineering and science. This medal may be awarded for general service in science having possible application in engineering.

Any member of the Society presenting the name of an engineer for the award of this medal shall forward a full statement of the grounds upon which the award might be expected, such statement to be published in *Mechanical Engineering,* or the award may be " as prescribed by Council," as noted in B8 (23). In no case, unless prescribed by Council, will an award be made until (1) the invention or improvement shall have been fully described in *Mechanical Engineering* for a period of thirty (30) days, and (2) a favorable recommendation by the Committee on Awards arrived at after the lapse of said thirty (30) days, and (3) a two-thirds vote of the Council at any regular or special meeting. Ordinarily only one (1) such medal a year will be awarded and that only for inventions and improvements of great merit in the technical and public sense. It is not required that this recipient shall be a member of the Society.

3 *Melville Medal,* instituted and endowed by Rear-Admiral George W. Melville, Honorary Member and Past-President of the Society, to encourage excellence in papers, for an original paper or thesis of exceptional merit, presented to the Society for discussion and publication.

4 *Junior Award,* a medal or monetary award, for the best paper or thesis submitted by a Junior Member, under the rules governing such awards.

5 *Student Awards,* two medals or monetary awards, for the best two papers or theses submitted by Student Associates or Enrolled Students, under the rules governing such awards.

6 *Prizes:* The Professional Divisions or the Local Sections or any other agency in the Society may establish and award prizes but these prizes shall not be considered as honors bestowed by the Society as a whole and shall be designated as prizes bestowed by the Professional Divisions, or Local Section, or any other agency.

7 *Holley Medal,* instituted and endowed in 1924 by George I. Rockwood, Past Vice-President of the Society; to be bestowed for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit; to be awarded under the provisions of the deed of gift as accepted by Council December 5, 1924.

(*See also Funds Available, on following page*)

JUNIOR AND STUDENT AWARDS

The following rules govern the distribution of these awards:

AWARDS FOR JUNIOR MEMBERS

(*a*) The competition for the award shall be restricted to the Junior Members of the Society.

(*b*) The award shall consist of a cash amount, with an engraved certificate signed by the President and Secretary of the Society.

(*c*) The award shall be bestowed for the paper, adjudged from the standpoints of originality of matter, applicability (practical or theoretical), and value as a contribution to mechanical engineering literature, logical development of contents, conclusiveness, completeness and conciseness.

(*d*) Papers to be eligible for competition shall have been produced by their authors without assistance, and shall not have been previously contributed to nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society during the year of the competition shall not be construed as making a paper ineligible.

(*e*) The papers considered shall include all papers presented to the Society by Junior Members during the year ending June 30.

(*f*) The Committee on Awards shall report its recommendation to the Council on or before October 1; the findings of the Committee shall be final. The award shall be bestowed by the Council. The awards shall be announced at the Annual Meeting and shall also be published in the Record and Index.

AWARDS FOR STUDENT ASSOCIATES AND ENROLLED STUDENTS

(*a*) The competition for the awards shall be restricted to Student Associates and Enrolled Students in good standing.

(*b*) The two awards bestowed each year shall each consist of a cash amount with an engraved certificate signed by the President and the Secretary of the Society.

(*c*) The awards shall be bestowed for two papers, adjudged from the standpoint of applicability (practical or theoretical), and value as a contribution to mechanical engineering literature, completeness, originality of matter, and conciseness.

(*d*) Papers to be eligible for competition shall have been produced by their authors without assistance and shall not have been previously contributed to nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society or by any of its Student Branches during the year of the competition shall not be construed as making a paper ineligible.

(*e*) The papers considered shall include papers submitted by Student Associates in competition during the year ending June 30.

(*f*) The Committee on Awards shall report its recommendations to the Council on or before October 1; the findings of the Committee shall be final. Awards shall be bestowed by the Council. The awards shall be announced at the Annual Meeting and shall also be published in the Record and Index.

Funds Available

The attention of our members is called to the following funds already established and available to carry out some of the awards granted by the Society.

(*a*) Henry Hess Funds, $1000 each. See Junior and Student Awards, pages 333 and 334.

(*b*) A gift from Charles T. Main, Past-President of the Society, of $2500, the income to be awarded annually for the encouragement of research, good papers, or other activity for the advancement of engineering by any member of the Society. This may take the form of a medal or of a cash prize. Furthermore, it may be given in addition to any other award at the discretion of the Council.

(*c*) Max Toltz Fund of $15,000, the income to be used for assistance to students.

(*d*) John R. Freeman Fund of $25,000, the income to be used for travel scholarships and research.

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Necrology

NECROLOGY

Wilbur Kingsley Abernethy

Wilbur Kingsley Abernethy, son of Elmer F. and Ella (Kingsley) Abernethy, was born on October 10, 1890, at Iron Mountain, Mich. The family moved to Dayton, Ohio, where Mr. Abernethy was graduated from high school in 1908. He attended Ohio Wesleyan University for two years, and later entered Purdue University, from which he received the degree of B.S. in Mechanical Engineering in 1916.

Prior to the completion of his college education, Mr. Abernethy had also acquired considerable practical experience with the Barney & Smith Car Co., of Dayton, as machinist and assistant to the mechanical engineer. His duties included general shop efficiency work and shop engineering and testing work, and he assisted in planning and executing a $150,000 plant improvement project, and in designing and constructing a new shrapnel forging plant.

After his graduation, he became district manager of the Minneapolis office of the Central Station Steam Company, of Detroit. He was made manager of the Chicago Branch Office at the end of his war service in 1919, and remained with this concern until the time of his death, handling sales and engineering.

Mr. Abernethy enlisted in the U. S. Air Corps and served as a Lieutenant in the Bombing Division during the World War.

On June 10, 1919, Mr. Abernethy married Pearl E. Rupel, of South Bend, Ind., and is survived by her and two sons. At the time of his death on July 23, 1928, he was a resident of Winnetka, Ill., where he had been active in church and community work. He had been an associate member of the A.S.M.E. since 1917.

Miguel Alvarez

Miguel Alvarez, Chief of Workshops for the Cia Chilena de Electricidad Ltda., Santiago, Chile, S. A., whose death occurred in Santiago on March 21, 1927, was born in Valparaiso on May 21, 1880. He studied at the Naval Engineering School (Escuela de Ingenieros de la Armada) in Valparaiso and received practical training in the workshops of the school, in the factory of Humphreys, Simsant & Co., and as artillery inspector for Armstrong, Whitwarth & Co., London.

From 1912 until 1917 Mr. Alvarez was superintendent of steel construction work, and in charge of all mechanical, electrical, steam, and compressed air machinery, for Th. Juan Tonkin. For the next two years he was general manager of the Colquiri Tin Mine, in Bolivia. During the following years with the Cia Chilena de Electricidad Ltda., he served for one year as engineer of permanent way and over three years as chief of workshops. He was in charge of the entire rolling stock of the company, consisting of over five hundred cars, and directed the construction of all manner of mechanical machinery. He was engaged also as engineer for the Traccion Eléctrico in Punta de Arenas and for the Compañia de Traccion y Alumbrado in Santiago.

Mr. Alvarez became a member of the A.SM.E. in 1924. He also belonged to the Instituta de Ingenieros Valparaiso and was a Mason.

Johan Marinius Andersen

Johan Marinus Andersen, president of the Albert & J. M. Anderson Mfg. Co., Boston, Mass., died at his home in Brookline, Mass., on July 25, 1928, in his seventy-third year.

Mr. Andersen was born at Borre, Norway, in November, 1855. His early training and shop experience were secured with the Akers Mekaniske Verksted and S. H. Lundh & Co., Christiania, Norway. He came to the United States in 1880, joining his brother Albert in Boston, and later serving as treasurer and finally president of the Albert & J. M. Anderson Mfg. Co.

As a pioneer in the manufacture of overhead line material and molded insulation for street railways, Mr. Andersen designed many of the present-day standards. Many notable achievements in the design and construction of switches, switchboards, circuit breakers, and allied products, as well as purely mechanical devices, are attributed to him. He was granted many patents on various inventions.

Mr. Andersen became a member of the A.S.M.E. in 1908. He belonged also to the A.I.E.E. and several clubs.

Arthur Herbert Annan

Arthur Herbert Annan, whose death occurred in Providence, R. I., on April 26, 1928, was a native of that city, where he was born on August 24, 1864. He attended the public schools of Weld, Me., where the family lived from 1869 until their return to Providence in 1880, and the Rhode Island School of Design in Providence.

In 1883, after an apprenticeship of three years with the American Screw Company, he became draftsman for the Rhode Island Tool Co. Three years later he went to New Haven, Conn., as draftsman for the New Haven Manufacturing Co. He returned to the Rhode Island Tool Co. in 1891 as its assistant superintendent, became its superintendent in 1905, and remained with the firm in this capacity until his death, designing, building, and superintending the operation of machinery for the manufacture of bolts, nuts, and kindred articles.

Mr. Annan became a member of the A.S.M.E. in 1909. He was also a member of the American Society for Steel Treating, the Industrial Relations Association of Rhode Island, and the Masonic fraternity, and had served the Providence Engineering Society as President.

William Addison Armes

William Addison Armes, mechanical engineer for the Parker Young Company, of Lincoln, N. H., engaged in reconstruction work after the floods of 1927, died at the Massachusetts General Hospital in Boston, on March 16, 1928.

Mr. Armes was born at Gardiner, Me., on August 6, 1877, and was educated in the public schools there and at the University of Maine, from which he was graduated in 1901.

During the latter part of his college course and after graduation Mr. Armes was employed by the Bath Iron Works, Bath, Me., as draftsman on marine design. In August, 1903, he entered the employ of H. S. Ferguson, Millinocket, Me., as draftsman on paper mill design. He remained there until May, 1904, when he became associated with the Burgess Sulphite Fibre Company, Berlin, N. H., as draftsman and inspector of erection. Two years later, in May, 1906, he was engaged as piping specialist and superintendent of construction at the Raritan Copper Works, Perth Amboy, N. J. In January, 1908, he joined the Atlas Portland Cement Company, Siegfried, Pa., as squad boss and inspector of erection. In May, 1909, he entered the employ of Westinghouse, Church, Kerr & Company, New York, N. Y., as squad boss in the erection of power plants and cement plants. He continued with them until August, 1911, when he was named engineer in charge of the design and erection of the power plant by the Morristown Light & Power Company. In February, 1912, he became resident engineer for Bird & Son at their Pont Rouge, P. Q., plant, and in September of that year he was made superintendent of the plant. Later he joined the International Paper Company in a similar capacity. During the World War he was plant engineer for the Lake Torpedo Boat Company, Bridgeport, Conn. After the war he was engaged in independent construction as industrial steam power plant engineer for some years before becoming associated with the Parker Young Company.

Mr. Armes became a member of the A.S.M.E. late in 1913, and also belonged to the Masonic fraternity. He is survived by his widow, Effie N. Deering, of Orono, Me., whom he married in 1906.

Samuel L. Ayr

Samuel L. Ayr was born in Glasgow, Scotland, on January 2, 1876, and died at his home in Detroit, Mich., on July 4, 1928.

After attending the public schools and Glasgow Technical College, he spent seven years with Aitken, McNeil & Co., Colonial Iron Works, Glasgow, two in the machine shops and five in the drawing-room. From 1897 to 1900 he was in the employ of John Brown & Co., Columbo, Ceylon, engaged in general engineering, including the laying down of steam and water power machinery for tea factories. For the next four years he was marine engineer for the British India Steam Navigation Company, London, and sailed between London and the Far East continuously during this period, first as a junior engineer and later as senior engineer. From 1905 to 1909 he was connected with John Brown & Co., Ltd., engineers and shipbuilders of Clydebank, Scotland, engaged in designing and constructing marine engines and boilers.

In 1909 Mr. Ayr followed other members of his family to America, and entered the employ of the Brown & Sharpe Mfg. Co., of Providence, R. I., as foreman in the gear departments. After two years in Providence, he went to Detroit, Mich., as superintendent in charge of the gear, heat-treating and hardening departments of the Packard Motor Car Co. For two years he was also in charge of the truck division.

Early in 1916 Mr. Ayr became factory manager for the Automatic Transportation Company of Buffalo, N. Y., and supervised the construction of electrical industrial trucks. He was also connected for a time with the Industrial Truck Company, Holyoke, Mass., as general manager. In 1920 he returned to Detroit to join the General Motors Corporation. Several years later he became associated with the William Ford Company, from which he was obliged to resign on account of ill health.

Mr. Ayr was an active member of the Masonic fraternity in Detroit. He became a member of the A.S.M.E. in 1917.

Elwood B. Ayres

Elwood B. Ayres, for nearly forty years associated with the firm of Proctor & Schwartz, Inc., Philadelphia, Pa., died on April 12, 1928.

Mr. Ayres was born in Hightstown, N. J., on January 13, 1871, and entered the employ of the Philadephia Textile Machinery Company, which later became Proctor & Schwartz, Inc., at the age of seventeen, as a journeyman carpenter. After a period of five years he was made general manager of shops, a position which he held for more than ten years. Mr. Ayres then became a member of the sales force and travelled extensively for the firm; in many cases he was called upon to design and supervise the construction of special machinery to suit the requirements of the customer. In 1917 Mr. Ayres was elected to the office of second vice-president, and as head of the special dryer department and the research department, he had charge of the design of many special drying machines, the development of new drying methods, and a variety of experimental work in drying all kinds of materials.

Mr. Ayres became a member of the A.S.M.E. in 1920, and also belonged to the American Ceramic Society, and a number of Philadelphia clubs.

Leland Rella Balch

Leland Rella Balch was born in Neillsville, Wis., on March 10, 1883. He was the son of the late Rella W. Balch and Nettie B. (Whipple) Balch, and a descendant in the tenth generation of John Balch of Somerset, England, who settled in Beverly, Mass., in 1626.

Mr. Balch spent his early life in Neillsville, where he fitted himself for college. He was graduated from the University of Wisconsin with the degree of B.Sc. in Civil Engineering in 1905, and received the degree of C.E. in 1909.

Mr. Balch spent the summers of 1902-1904 as an assistant to the County Engineer of Clark County, Wis., and began his professional work with the States Reclamation Service as engineer's assistant, later becoming instrument man, and then chief of party and resident engineer in charge of surveys on the Huntley, Sun River, Blackfeet and Flathead irrigation projects in Montana. From September, 1909, to March, 1910, Mr. Balch spent his time in post-graduate work at the University of Wisconsin. From April, 1910, to October, 1911, he was assistant engineer with the U. S. Reclamation Service on the Shoshone project in Wyoming.

From November, 1911, to August, 1912, he was research assistant in hydraulics at the University of Wisconsin and spent his time in experimental research and in the preparation of technical bulletins for publication. He prepared several important bulletins, among which were "Tests of Flash Wheels," "Flow through Submerged Orifices and Tubes," and "Hydraulic Curve Resistances."

From 1912 until his death, Mr. Balch was with the firm of Daniel W. Mead and Charles V. Seastone, consulting engineers of Madison, Wis. With this firm Mr. Balch had responsible charge of the design and construction of many important works, among which may be mentioned the reconstruction of the municipal pumping plants at Madison, Wis., Rockford, Ill., Dubuque, Iowa, and Harvard, Ill.; additions to the power plants of the Madison Gas & Electric Co. at Madison, Wis., the Mississippi Valley Public Service Company, Winona, Minn., Peninsular Power Company, Iron River, Mich., and the Eastern Oregon Light & Power Co., Baker, Ore.; and design and construction of the Diesel electric plant of the Peninsular Power Company at Iron River, Mich.

Mr. Balch also participated in the investigations, the preparation of reports, and in the design of numerous water works, water power and sanitary works, in various appraisals and valuations, and also in numerous investigations and reports on power projects and flood protection works.

Mr. Balch rendered important service in editorial work in the preparation and revision of various text books by Professor Mead, including "Water Power Engineering", "Hydrology", and "Contracts, Specifications, and Engineering Relations."

Mr. Balch joined the A.S.M.E. as a member in 1923. He was also a member of the A.S.C.E. and the Engineering Society of Wisconsin, an associate member of the Wisconsin Utilities Association, a member of the Madison Technical Club, and a 32d degree Mason. His death came on April 18, 1928. He is survived by his widow, Margaret (O'Reilly) Balch, whom he married in Chicago, Ill., on June 15, 1918, and by four children.

Clarence Kemble Baldwin

Clarence Kemble Baldwin, an authority on machinery for handling heavy and bulk materials, died in Los Angeles, Calif., on August 9, 1928. Mr. Baldwin was born in Philadelphia, Pa., on February 8, 1873, the son of Louis Kemble and Sarah B. (Gray) Baldwin. He attended the Philadelphia Manual Training School and was graduated from Lehigh University with an M.E. degree in 1895.

After a few months in drafting-room work with the Wharton R. R. Switch Co., Jenkintown, Pa., he became connected with the Lehigh Valley Coal Co., Wilkes-Barre, Pa., as mechanical engineer, engaged in the design and erection of coal breakers and their machinery, steel buildings, head frames, boiler plants, pumping plants, etc. He then spent a few months with the Crocker-Wheeler Elec. Co., working on the design of electrical machinery, mainly small motors.

Mr. Baldwin married Helen M. Abbott, of South Bethlehem, Pa., in 1899. In November of that year he joined the engineering force of the Robins Conveying Belt Company, which was then introducing the belt conveyor as a means of handling heavy materials. Soon afterward Mr. Baldwin became chief engineer of the company, and later he was western manager, in the Chicago office, and then vice-president of the company.

Mr. Baldwin was largely responsible not only for numerous improvements in conveying machinery, but for its introduction into many fields in which it is now indispensable, for instance, the by-product coke industry. He invented various devices for handling bulk materials and through his close study of all the technical requirements and his sound engineering judgment he became a recognized authority and was given a free hand in equipping various plants with conveying machinery. During the thirty years of his active career the capacities of conveyors and machinery for unloading vessels were increased tenfold, and credit for a large measure of this development belongs to Mr. Baldwin.

Many articles on materials handling were contributed to the trade papers and engineering societies by Mr. Baldwin. He was associate editor of Marks' Mechanical Engineers' Handbook, editing the Hoisting and Conveying Section. He was deeply interested in aviation, and had a remarkable collection of works on this subject. He was a member of a number of technical societies, including the A.S.M.E., of which he became a member in 1905, the A.I.M.E., Western Society of Engineers, American Gas Institute, and American Iron and Steel Institute. He belonged to engineering and other clubs in Chicago, Pittsburgh, and New York.

Mr. Baldwin not only contributed tremendously to the development of materials handling equipment, but, on the human side, devoted much time to the assistance and development of young associates.

Edward D. Beals

Edward D. Beals, president of the Hardwood Products Corporation, of Neenah, Wis., died on October 24, 1928, leaving his wife and three daughters. Mr. Beals was born on February 26, 1882, in St. Paul, Minn. He received an M.E. in Electrical Engineering from Cornell University in 1903. He spent a year with the Barber Asphalt Paving Co., as plant inspector and assistant superintendent of the plant at Minneapolis, Minn., and another year with the Twin City Rapid Transit Co., Minneapolis, as testing engineer and assistant operating engineer.

From 1905 to 1910 Mr. Beals was associated with the Allis-Chalmers Mfg. Co., Milwaukee, Wis., serving as erecting engineer, assistant superintendent of erection, assistant to the manager of works, and engineer in the hydraulic turbine department.

His connection with the Hardwood Products Corporation and its associated company, the Mississippi Veneer & Lumber Co., Cedars, Miss., began in 1910, when he became treasurer of the former concern, and vice-president of the latter. From 1913 until the time of his death he was president of the former organization, with the exception of the year which he spent as Lieutenant in the Bureau of Ordnance, U. S. Navy Department, in Washington, during the World War.

Mr. Beals became a member of the A.S.M.E. in 1921, and belonged to several clubs in different cities.

Milton Beck

Milton Beck, a consulting engineer of wide experience in the automotive field, was born at Macomb, Ill., on December 3, 1871. He received a B.S. in Mechanical Engineering from the South Dakota State College in 1896 and did post-graduate work in machine design and testing at Purdue University during the following year.

In the development of steam and internal-combustion engines, Mr. Beck was associated with a large number of manufacturing concerns. His first experience was in the design of gas and steam engines for the Racine Hardware Company of Racine, Wis. As chief draftsman for the Olds Motor Works, Detroit, Mich., from 1899 to 1902, he designed the first commercial Oldsmobile and a full line of stationary gas and gasoline engines. For the next eight years he was chief engineer for the Alamo Engine Company of Hillsdale, Mich., designing approximately one hundred models of Alamo internal-combustion engines, as well as other machinery, including mining hoists, pumping outfits, and farm tractors.

From 1910 to 1918 Mr. Beck was engaged in research work for different companies. For the Ferro Machine & Foundry Co., Cleveland, Ohio, he conducted a special study of foundry practice and equipment and the physical properties of metals. He made a survey of the tractor field and industry for R. E. Olds, of Lansing, Mich., and investigated marine and airplane engines for the Van Blerck Motor Co., Munroe, Mich. The Willys-Overland Co., Toledo, Ohio, engaged him to correct its designs to facilitate manufacturing and to make a special research on balancing motors. From 1916 to 1918, as research engineer for the Duesenberg Motors Corporation, in its Chicago and Elizabeth, N. J., plants, he checked the final designs for marine, airplane, and automotive engines.

In 1919 Mr. Beck became vice-president of the Page, Beck & White Co., of Chicago, in charge of design and testing of steam and internal-combustion engines. Other firms by which he had been engaged since 1923 either as chief engineer or consulting engineer were the Stanley Motor Carriage Co., Newton, Mass ; Brooks Steam Motors, Stratford, Ontario ; Snow Motors, Detroit, Mich ; Bowden Cycle Engine, Valparaiso, Ind. ; Stanley Brothers, Inc., Chicago ; and Lasley Gas Turbine, Waukegan, Ill.

Mr. Beck belonged to the American Society of Automotive Engineers and the A.S.M.E., of which he became a member in 1921, and the Masonic fraternity. His death occurred on April 23, 1928. He is survived by his widow, Laura (Stephenson) Beck, and one son.

George Whitefield Bergen

George Whitefield Bergen, a refinery and power plant engineer, was born on August 7, 1894, in New York, N. Y. He entered the Stevens Institute of Technology from the Jamaica, L. I., High School, and was graduated with the degree of M.E. in 1917. Immediately upon graduation he began the Executives Training Course at the Winchester Repeating Arms Company, New Haven, Conn., and in the early part of 1918 was acting as supervisor of the production of Gun " D " for the company.

From June, 1918, until May, 1919, he served as a commissioned engineer officer in the U. S. Naval Reserve, in charge of the power plant aboard the *U. S. S. Orion,* during the most of the time.

After leaving the service, from May, 1919, until February, 1921, Mr. Bergen was sales engineer for the Sarco Co., Inc., of New York, N. Y. He then entered the employ of the Tide Water Oil Co., Bayonne, N. J., as assistant to the mechanical superintendent. When a reorganization of the plant took place in January, 1925, Mr. Bergen was promoted to the position of superintendent of the steam, power, air, and water departments, and was also made chief combustion engineer for the whole refinery.

In March, 1926, Mr. Bergen became associated with the Brooklyn Edison Company as assistant plant equipment engineer, responsible for the selection of all mechanical equipment used in the stations of the company. A year later he became chief engineer for the Robinson, Butler, Hemingway & Co., New York, and was in charge of designing and erecting a large coal tar refinery at Clairton, Pa., for the Carnegie Steel Company.

Mr. Bergen first joined the A.S.M.E. as a junior in 1919, and at the time of his death, on March 30, 1928, had become a full member. He also belonged to the Masonic fraternity. He is survived by his widow, Harriet M. Bergen.

William Herbert Bixby

Brigadier General William Herbert Bixby, retired, former Chief of Engineers, U. S. Army, died on September 29, 1928, at the Walter Reed General Hospital in Washington, D. C., after a brief illness. His ashes were interred at the Arlington National Cemetery.

General Bixby was a native of Charlestown, Mass., where he was born on December 27, 1849, the son of Clark Smith and Elizabeth (Clark) Bixby. He attended the public schools of Brookline and Cambridge, and after two years at the Massachusetts Institute of Technology he was appointed to the United States Military Academy at West Point from Massachusetts in 1869. He stood at the head of his class when he was graduated in 1873. He was given the commission of Second Lieutenant in the Engineers Corps and spent the next two years in the post-graduate School of Application, at Willetts Point.

From 1875 to 1879 he was instructor and acting assistant professor of civil engineering at the United States Military Academy. He was then sent to France to inspect fortifications and watch army maneuvers and in 1881 he was an honor graduate from the French national School of Bridges and Highways (École des ponts et chaussees).

General Bixby was identified with many important engineering works during his years of service. As District or Division Engineer, Lighthouse Engineer or Inspector, in various sections of the United States, he contributed greatly to the improvement and regulation of waterways and inland navigation. More specifically, he was for two years in charge of work on the ship channel through the Great Lakes from Buffalo to Duluth, lock construction at Sault Ste. Marie, and regulation of Lake Superior waters for navigation and water power. For four years he supervised all river and harbor matters on the Great Lakes and the Lake Michigan water diversion, and for two years directed improvements on the upper Mississippi and the Missouri.

He was in charge of river and harbor improvements and army engineering in other states, including North and South Carolina and Virginia, Massachusetts, Rhode Island, and Connecticut, Indiana and Illinois, and in the Ohio Basin.

General Bixby was noted particularly for his work in connection with the development of the Mississippi Flood Control Project. He served as president of the Mississippi River Commission, was designated by Congress to act as chairman of the Board to consider waterway connections between the Great Lakes and the Gulf, and cooperated with the State Department in the regulation of the water diversion from the Rio Grande below El Paso.

In 1909 General Bixby was Advisory Engineer to the U. S. National Waterways Commission during their inspection of waterways in England, France, Belgium, Germany, and Austria-Hungary.

General Bixby was appointed Chief of Engineers and received the rank of Brigadier General in June, 1910, and served in this office until his retirement in 1913. His duties carried with them a constant consideration of the diversion of water for irrigation and water power, as well as the use of water for navigation; and a constant study of engineering jurisprudence and construction. In 1911, when the International Joint Commission was first appointed, General Bixby cooperated with the Commission chairman in drafting the rules of procedure for the boundary water work which up to that time had been largely in the hands of the Army Engineers. It was during this period, also, that General Bixby was in charge of an engineering achievement of particular note — the raising of the Battleship *Maine* in Havana Harbor, in 1912.

General Bixby was also an authority on bridge construction, and foresaw the practicability of a bridge across the Hudson at a time when such a project was deemed visionary and impossible.

At his own request he was retired on August 11, 1913, several months before reaching the age of retirement, in order that his friend, Colonel W. T. Rossell, who had ranked next to him in scholarship at West Point, might be appointed Chief of Engineers and advanced to the rank of Brigadier General. Except for General Bixby's action, Colonel Rossell, who was within two months of the retirement age, would not have gained the higher rank.

General Bixby returned to active service from May, 1917, to April, 1919, during which time he was again president of the Mississippi River Commission and was Division Engineer for the Western Division of River and Harbor Improvements and Inspector in the Fifteenth Lighthouse District, releasing younger officers for World War Service.

General Bixby was President of the International Congress of Navigation in Philadelphia, in 1912; Chairman of the Engineering Section of the Second Pan-American Scientific Congress in Washington, in 1925; President of the American Society for Testing Materials in 1917-1918; and of the Society of

Terminal Engineers the following year. He was a life member of the A.S.M.E., which he joined in 1888. For many years he had been the A.S.M.E. representative on the Joseph A. Holmes Memorial Board and had also represented the Society at the annual National Rivers and Harbors Congress. He was also a member of the American Society of Civil Engineers, the Société des Ingénieurs Civils de France, the Institution of Civil Engineers, American Institute of Consulting Engineers, American Academy of Political and Social Science, U. S. Naval Institute, several military organizations, the American and British Associations for the Advancement of Science, the American Economic Association, Washington Academy of Sciences, and Washington Society of Engineers. He was a fellow of the American Academy of Arts and Sciences.

In addition to his valuable reports on river and harbor improvements, he wrote various articles on waterway improvements which were published by the National Rivers and Harbors Congress. He enjoyed outdoor sports and was a member of a number of clubs in different cities. His home in recent years had been in Washington, D. C. He is survived by his widow, Lidey H. Rogers Jones Bixby, formerly of Philadelphia, whom he married in 1893.

George William Blair

George William Blair, whose death occurred on December 19, 1928, was born at Derry, Pa., on March 5, 1897. He was educated at the University of Pennsylvania and Purdue University, from which he was graduated in 1922 as a mechanical engineer.

After graduation Mr. Blair joined the United States Aluminum Company and was located in the operating and later in the inspection department of the New Kensington, Pa., works. In 1924 he was connected with the Aluminum Seal Company, and later was transferred to the sales department of the Aluminum Company of America, both in New Kensington. He was engaged in engineering work in this department at the time of his death.

Mr. Blair became a junior member of the A.S.M.E. in 1924. He also belonged to the Masonic fraternity.

William H. Bone

William H. Bone, one of the first members of the A.S.M.E., having joined the Society in 1883, died on December 19, 1928.

Mr. Bone was first vice-president and general manager of The Ironsides Company, of Columbus, Ohio, manufacturers and distributors of special lubricants and preservatives, since 1898. Prior to that date he was in the employ of Poole & Hunt, Baltimore, Md., for seven years; Nordyke & Marmon Co., Indianapolis, Ind., for two years, as designer of tools and flour mill machinery; and with the Walker Manufacturing Company, of Cleveland, Ohio. He also taught evening school for pattern makers, advanced machinists, and foremen.

Ralph Hinckley Bourne

Ralph Hinckley Bourne, whose death occurred at Wareham, Mass., on November 27, 1928, was born at Cleveland, Ohio, on August 9, 1881. He received his M.E. from Cornell University in 1905 and entered the employ of Wellman-Seaver-Morgan Co., in Cleveland, as draftsman. In June, 1906, he became designer for Hoover & Mason, Chicago, Ill., working on a circular rolling car dump.

In 1907 Mr. Bourne accepted the position of estimator for the Whiting Foundry Equipment Co., Harvey, Ill., later reorganized as the Whiting Corporation. He was successively sales engineer, sales manager, and finally senior vice-president for the company, with which he remained until the time of his death. This company deals in cranes, foundry equipment, and railway specialties.

Mr. Bourne became an associate member of the A.S.M.E. in 1914, and belonged also to a number of clubs in Chicago and vicinity.

George Russel Brandon

George Russel Brandon was born in Missouri on September 10, 1869. At an early age he went to Detroit, Mich., where he attended the public schools. He received a B.S. degree in mechanical engineering from the University of Michigan in 1891, and entered the employ of the Detroit Foundry Equipment Company, with which he remained until 1897. For many years he was vice-president and general engineer of the Whiting Foundry Equipment Company, Harvey Ill. At the time of his death, which occurred on December 6, 1928, he had retired from business on account of ill health.

Mr. Brandon joined the A.S.M.E. in 1897 and became a full member in 1901. He also belonged to the Western Society of Engineers and several clubs. He is survived by his widow.

Willard Brown

Willard Brown was born in Newark, N. J., on June 6, 1873, the son of George and Margaret (Giffins) Brown. He attended the public schools there, and was graduated from Stevens Institute of Technology in 1895 with the degree of M.E.

After a short time as assistant master mechanic for the Pencoyd Iron Works, Pencoyd, Pa., he went to Cleveland, Ohio, and entered the employ of the King Bridge Company, where he remained until 1898, when he went to work in the drafting room of the Lorain Steel Company, Lorain, Ohio. In the fall of 1899 Mr. Brown was sent to Pittsburgh, Pa., to superintend the construction work being done there for a new plant of the Dominion Iron & Steel Company in Sidney, N. S., to which upon its completion a year later, he was transferred as assistant engineer. He remained there for one year, and then went to Pueblo, Colo., in the employ of the Colorado Fuel & Iron Co., as construction engineer. After a short time he was engaged by The Garrett-Cromwell Engineering Company, who had charge of the work, to take care of it for them. Upon completion of the job in the spring of 1904 Mr. Brown returned to Cleveland, remaining with Garrett-Cromwell, as a member of the firm, until 1910.

After serving The Upson Nut Company, Cleveland, as chief engineer for a time, and doing some independent work as a rolling mill engineer, Mr. Brown became chief engineer of the Bourne-Fuller Company, Cleveland, in the spring of 1912, and remained with this firm until his death on December 28, 1927.

Mr. Brown was an active member of the Congregational church, serving as trustee for fourteen years, a member of the New England Society in Cleveland, and became a member of the A.S.M.E. in 1910. He is survived by his widow, Grace (Hessler) Brown, whom he married in 1900, and by six children.

Howard E. Bundy

Howard E. Bundy, who became a junior member of the A.S.M.E. in 1923, died at the hospital in Marion, Ind., on March 16, 1928, of a tumor. Mr. Bundy was a native of Marion, where he was born on September 6, 1899. After being graduated from the high school there he attended Earlham College, Richmond Ind., for one year and then continued his studies at the Massachusetts Institute of Technology, where he specialized in electrical engineering and business administration.

For several years after he left Cambridge, Mr. Bundy was sales engineer for the Foxboro Manufacturing Company of Foxboro, Mass., located first at Boston and later at Albany, N. Y., and handling temperature and humidity controllers and recorders, and general power plant instruments, such as gages, draft indicators, etc.

Later he became associated with the Carborundum Company of Niagara Falls, N. Y., as efficiency engineer in the production department. He returned to his home in Marion early in 1928.

Douglas Bunting

Douglas Bunting, vice-president and general manager of the Lehigh & Wilkes-Barre Coal Company, died on December 15, 1927, at the Wilkes-Barre General Hospital, a few days after an intestinal operation.

Mr. Bunting was born at East Mauch Chunk, Pa., on March 17, 1870, the son of Dr. Thomas C. and Elizabeth (Douglas) Bunting. He received his early education in the schools of Mauch Chunk and in the Friends Preparatory School in Philadelphia, and then went to Cornell University, from which he was graduated in 1894 with the degree of M.E. After a year in construction work with the Central Railroad of New Jersey, and a short period with the Mt. Jessop Coal Company as surveyor and draftsman, he became associated with the firm with which he remained until his death. He was elected vice-president and general manager in 1924.

Mr. Bunting attained a prominent position in the mining industry, from the standpoints of both engineering and operating, and his judgment and skill were sought and utilized by many of the larger companies of the anthracite industry. He was also a leader in church and community work, serving as an officer in the clubs to which he belonged, and assisting in the development of the golf course and building equipment of the Wyoming Valley Country Club. He was a director of the Morris Run Coal Mining Company and the Wyoming National Bank of Wilkes-Barre, and belonged to several engineering societies, including the A.I.M.E. and the A.S.M.E., of which he became a member in 1902. He is survived by his widow, Romayne Seybolt, formerly of Scranton, whom he married in 1901, and one daughter.

William Freeman Burleigh

William Freeman Burleigh was born in Worcester, Mass., on May 4, 1872, and attended the public schools there and the Worcester Polytechnic Institute, from which he received a B.S. degree in 1892. He acquired his drawing-room and shop experience with the Norton Emery Wheel Company of Worcester during the next three years, and during a part of this time was also associated with Charles E. Munroe and F. F. Brown as assistant chemist at the Torpedo Station at Newport, R. I. In 1893 he was assistant to the superintendent of the Sewage Purification Works, in Worcester.

In 1894 Mr. Burleigh became chemist and the following year engineer of tests for the Spaulding & Jennings Co., Jersey City, N. J., in charge of laboratory, furnaces for crucible steel, physical tests, heat treatments, etc. He worked with Chief Engineer Holt in mechanical designing in connection with furnaces, molds, rolling mills, and building construction, and also carried on heat treatment work on rifle barrels and steel for other rifle parts, at the Springfield, Mass., Armory.

Mr. Burleigh became assistant superintendent of the Murphy Varnish Company, Newark, N. J., in 1901, and later was advanced to the position of general superintendent and was appointed a vice-president of the concern. In 1912 he was engaged by Joseph H. Wallace & Co., industrial engineers and chemists, as research chemical engineer to study the development of methods of manufacturing by-products in paper mills for their client, Pine-Waste Products, Inc., New York. He was associated with the latter concern for ten years in this work. He also served the Chemical Company of America, Jersey City, N. J., as chemical engineer.

Mr. Burleigh became a member of the A.S.M.E. in 1905. He belonged also to the New Jersey Society of Professional Engineers and Land Surveyors and the Newark Museum Association. His death occurred in Newark on April 19, 1928. He is survived by his widow, Maria Wright Burleigh.

Eugene Dickinson Burnell

Eugene Dickinson Burnell, vice-president of the Overman Cushion Tire Company, New York, N. Y., died at Atlantic City, N. J., on February 20, 1928. Mr. Burnell was born on December 11, 1884 at Stellacoom, Wash. He was graduated in 1906 from Cornell University with the degree of civil engineer.

During the years from 1906 to 1919 Mr. Burnell was engaged in the design, construction, and operation of numerous important civil engineering projects. As assistant engineer for Hugh L. Cooper & Co., New York, he assisted from 1906 to 1909 in designing and estimating for hydroelectric power plants and their equipment. In 1909 he was engineer for the Isthmian Canal Commission and designed locks and their operating mechanism in the Canal Zone. As resident engineer and construction superintendent for J. G. White & Co., New York, from 1910 to 1913, he was engaged in the design and construction of power plants and installation of machinery. He then supervised the construction of several hydroelectric developments for the Electric Bond & Share Co., New York.

In 1914, Mr. Burwell supervised construction of ten miles of standard gage railroad track for the Power Construction Company, of Shelbourne Falls, Mass. The following year, serving in the same capacity for the Winnipeg Aqueduct Construction Company (Northern Construction Company), of Winnipeg, Canada, he had charge of the construction of ten miles of a five-foot concrete water-supply aqueduct. He was next engaged by the Canadian Car & Foundry Co., Montreal, Canada, as works manager, in charge of rebuilding and enlarging a shell-loading plant, and then increasing production, at Kingsland, N. J.

During the World War Mr. Burnell was chief engineer and works manager, first for the Evans Engineering Corporation and then for the Atlantic Loading Company, both of New York, and was engaged in the design, construction, and operation of munition and shell-loading plants.

His next peace-time industrial activity was the investigation of business conditions as assistant district manager for The Foundation Company, New York.

In 1921 he became assistant to the president of the Overman Cushion Tire Company, Inc., and assumed the president's duties on sales, finance, and production. In 1923 he was elected vice-president of the company.

Mr. Burnell was an associate member of the American Society of Civil Engineers, a member of the Society of Automotive Engineers, and had been a member of the A.S.M.E. since 1919. His widow, Augusta A. Burnell, survives him.

Charles Underwood Carpenter

Charles Underwood Carpenter, well known in the electric refrigeration industry, was born at Cambridge, Ind., on January 8, 1872. He received a B.A. degree from Princeton University in 1893. His practical and shop experience was gained at the works of the National Cash Register Company, at Dayton, Ohio, where he advanced successively from head of the Inspection Department to an appointment as one of the four factory managers in direct charge of 3000 men. Later he was made head of the Labor Department and member of the Executive Board of Directors.

In 1903 Mr. Carpenter was made vice-president of the Herring Hall-Marvin Safe Company, Hamilton, Ohio, and manager of its factories, which he thoroughly reorganized. In 1906 he became president of this company. He also served as president of the Security Steel File Company, general manager of the Nizer Corporation, president of the Fire-Proof Furniture & Construction Co., Miamisburg, Ohio, vice-president of The Republic Motor Car Co., Hamilton, Ohio, president of the Midland Ores & Patents Co., New York, works manager of the Recording & Computing Machines Co., Dayton, Ohio, and president of the Dayton Portable Typewriter Company.

Among other companies with which he was connected at various times in executive capacities were the Canadian Car & Foundry Co., the Steel Equipment Corporation, and the American Stamping & Ticket Vending Machine Co. For several years he was general manager of the Frigerator Division of the General Necessities Corporation, Detroit, Mich., resigning this position in August, 1927, on account of ill health. He died on January 14, 1928, at the home of his mother at Floral Park, Long Island, N. Y., where he had gone to recuperate.

Mr. Carpenter was president of the Detroit Chapter of the Society of Industrial Engineers, and had been a member of the A.S.M.E. since 1907.

Jesse Douglas Carr

Jesse Douglas Carr, a specialist in the design of high economy superheated steam power plants, was born on June 14, 1879, in Monterey County, Cal. After preparatory work at the Belmont Military School at Belmont, Cal., Mr. Carr studied mechanical engineering at Stanford University, from which he was graduated in 1903.

He immediately went into the San Francisco office of the Tracy Engineering Company and worked on power-plant drafting. In a few months he was made chief draftsman. At the end of the first year he was transferred to the Los Angeles office as erecting engineer installing steam and electric power plants. He was next made manager of that office and specialized in the original design of high superheated steam power plants.

In 1908 Mr. Carr organized and supervised the establishing of the Carr Engineering Company, for general foundry and machine shop business. In 1908 and 1909 he was also mechanical engineer in the U. S. R. S.

In 1909, following the sale of the Carr Company, Mr. Carr again became associated with the Tracy Engineering Company, as field superintendent in charge of the installation of sixteen high pressure 1000 hp. oil pumping stations for the Associated Oil Company. After this work was completed he returned to the Los Angeles office where he remained as mechanical engineer and field superintendent until the company went out of business in 1915.

His next position was that of factory superintendent for the American Cement Products Company, for which he designed and built a new factory. The following year the company changed hands, and Mr. Carr went into business for himself, experimenting with apparatus for deep oil well pumping. He continued in consulting and patent work, much of which related to mill designing for mining companies, until 1924. At that time he became associated with the Los Angeles Bureau of Power and Light, with which he remained until his death, on January 19, 1928.

During the twenty-five years of his business life Mr. Carr designed and installed structural steel, reinforced-concrete and wooden buildings and other structures. He installed steam and electric machinery and equipment involving the moving of four 55,000 barrel steel oil tanks weighing over 100 tons each.

Mr. Carr became a member of the A.S.M.E. in 1910. He also belonged to the American Association of Engineers and the National Society of Military Engineers. He was a member of one of the pioneer families of California, and made his home with his sister, Mrs. Louise Koons, of Los Angeles, by whom he is survived. He read extensively and had considerable knowledge of woodcraft and animal life.

Abel Delancey Catlin

Abel Delancey Catlin was born in Schuyler County, New York, in December, 1848. He served an apprenticeship at the wagon-maker's trade, and later moved to Seneca Falls, N. Y., where he learned the machinist's trade at the plant of the Silsby Manufacturing Company, and subsequently manufactured such tools as taps, reamers, dies and gear cutters.

In 1879 Mr. Catlin moved to Bay City, Mich., where he had charge of the machine shop for Smalley Bros. & Co., whose principal line of business was the repairing of sawmill machinery. After about two and a half years with this concern Mr. Catlin entered the employ of the Standard Machinery Company, of Bay City, with whom he remained five years.

Mr. Catlin moved to Chattanooga, Tenn., in 1888, and organized the Chattanooga Machinery Company, of which he was president until his death. During the early eighties he invented the steam cushioning cylinder for operating log-handling machinery in sawmills. Steam cylinders of this type are in use today in practically every sawmill, for operating jump saws, log stops and loaders, and steam niggers. About 1890 Mr. Catlin designed and patented machinery for turning and threading wood insulator pins. This line of machines has produced a large percentage of the pins that have been used for carrying telephone, telegraph, and power lines in this and other countries. Mr. Catlin designed one hundred machines for special operations in the woodworking industry. About 1897 he designed and later patented a machine for keyseating pulleys, gears, and similar machine parts, which has become known as the Catlin keyseater, and is in constant demand. His interest in woodworking machinery no doubt might be traced to the fact that his father, a farmer, also operated a sawmill.

Mr. Catlin joined the A.S.M.E. in 1906 as a junior and was promoted to full membership the following year. He was a charter member of the Chattanooga Manufacturers Association, and a 32d degree Mason. His death occurred on September 16, 1928, while he was visiting his former home in Seneca Falls. He is survived by his widow.

Albert Champion

Albert Champion, whose death occurred on October 27, 1927, was born on April 2, 1878 in Paris, France, and was educated in the public schools there. He served an apprenticeship with the firm of Clement, in the suburbs of Paris, manufacturers of bicycles and later of motorcycles and automobiles.

In 1900 Mr. Champion came to the United States and located in Boston, where he imported and later manufactured motors, magnetos, ignition coils, and spark plugs for automobiles. In September, 1908, he helped to found the Champion Ignition Company of Flint, Mich., the name of which was changed to the A C Spark Plug Company in 1919. Mr. Champion served the company as general manager and vice-president and later as president. From a very humble beginning it developed under his leadership to one of the largest automotive accessory concerns in the world, with plants in Flint, Mich., Birmingham, England, and Paris, France. He was responsible for a good many special machines used in factories of the company and held patents on a number of its products.

Mr. Champion became an associate of the A.S.M.E. in 1914.

Heman W. Chandler

Herman W. Chandler was born at Jordan, N. Y., on May 19, 1890, and after attending the public schools there, and taking post-graduate work at Syracuse High School for a year, entered Syracuse University, from which he was graduated in 1914 with an M.E. degree.

He worked as draftsman on stationary boilers and engines for the Ames Iron Works, Oswego, N. Y., for a short time, and then entered the machine shops of the American Locomotive Company at Dunkirk, N. Y., as a special engineering apprentice. About the end of 1915 he was transferred to the Maintenance Department, where he remained until his death on September 9, 1928. His duties involved repairs of all electrical and mechanical equipment, design, estimating, layout, and installation of new equipment, erection of new shops, and installation of heating and water-supply systems for new buildings.

Mr. Chandler was elected a junior member of the A.S.M.E. in 1917 and was promoted to the grade of associate member in 1919. He belonged to the Masonic fraternity and the Methodist Church.

Henry R. Cooper

Henry R. Cooper, whose death occurred on December 15, 1928, was born on June 22, 1856, on a farm near Woodbury, N. J., the youngest of eight children. In 1865 the family moved to Philadelphia, Pa., where he attended the Friends Central School. In 1873 he left school and engaged as an apprentice in the art of "turning and planing" to William Sellers & Co., of Philadelphia.

Upon completion of his apprenticeship Mr. Cooper entered the employ of the Stow Flexible Shaft Company, of Philadelphia, with which he remained for two years. In 1880 he became connected with the Edge Moor Iron Works, of Wilmington, Del. Three years later he moved to Syracuse, N. Y., where he was engaged by the Solvay Process Company. He was sent abroad during the summer of 1883 with a group of engineers to study and observe the methods and operations in the Solvay plants in Belgium and England. From the time of his return to this country until 1887 he was engaged in the production of soda ash and in perfecting apparatus and methods of manufacture at the Syracuse plant.

In 1887 Mr. Cooper was again sent to Europe, to study methods of the manufacture of caustic soda. Upon his return he directed the construction of a plant for this purpose and served as manager of the caustic soda department of the company until 1912, when he retired from active business on account of ill health resulting from injuries received in a gas explosion which occurred during the early days of the operation of the Syracuse plant.

Mr. Cooper became a junior member of the A.S.M.E. in 1890 and was promoted to full membership in 1895.

Frederick Kent Copeland

Frederick Kent Copeland, president of the Sullivan Machinery Company, Chicago, Ill., since 1892, died on November 10, 1928, following an operation for appendicitis. He was making a visit to the company's eastern works at Claremont, N. H., when he was taken ill.

Mr. Copeland was born in Lexington, Mass., in August, 1855, and was graduated from the Massachusetts Institute of Technology in 1876, with an S.B. in C.E. After several years spent in Iowa and Colorado in mining engineering work, he helped to organize the Diamond Prospecting Company in 1884, and became its president. This company engaged in contracting with the Diamond core drills made at Claremont by the Sullivan Machinery Company. In 1892 these two companies were merged, with Mr. Copeland as president. Under his leadership Sullivan products were developed for a wide range of purposes, serving the mining, quarrying, construction, and manufacturing industries, manufactured at plants in Claremont, and Michigan City, Ind., and a world-wide sales organization was built up.

Mr. Copeland was a member of a number of engineering societies and clubs, including the American Institute of Mining and Metallurgical Engineers, The American Society of Mechanical Engineers, which he joined in 1914, and the New York Engineers' Club, and was a past president of the Engineers' Club of Chicago, the Western Society of Engineers, and the National Metal Trades Association. He had served as trustee of the Massachusetts Institute of Technology.

A dominant note in Mr. Copeland's life was his interest in outdoor life, an inheritance from his father, Robert Morris Copeland, a distinguished landscape architect. At his home in Winnetka, Ill., where he lived for nearly forty years, he spent much of his leisure time working with plants, shrubs, and flowers. Each year, with a small party of friends, he spent a month on horseback in the Wyoming mountains.

Mr. Copeland is survived by his widow, a son, Frederick W., vice-president of the company in charge of foreign business, and a daughter.

Alexander William Copland

Alexander William Copland, president of The Copland Gear Lapping Syndicate, Detroit, Mich., died at his home near Birmingham, Mich., on April 23 1928, after being in ill health for nearly a year.

Mr. Copland was born at Detroit in November, 1867, and attended the public schools there and Shattuck Military Academy. After a year as superintendent of the Detroit Cracker Company, and a second year as assistant to the manager of the United States Baking Company, both in Detroit, he went to Cincinnati, Ohio, to become manager of the plant of the National Biscuit Company in that city. During eight years spent in that position he invented a cake baking machine which revolutionized previous methods. From 1900 to 1903 Mr. Copland was factory manager of the Copland Baking Company of Somerville, Mass.

From 1903 to 1910 Mr. Copland was a member of the firm of Alexander W. Copland Co., Detroit, Mich., engaging in the invention and manufacture of automatic biscuit baking machinery. He designed the Copland duplex depositor and several other automatic machines for biscuit bakers. During this period he spent three years, 1903-1905, in London, assisting Joseph Baker & Sons, Ltd., engineers, in designing machinery and supervising its manufacture.

In 1910 Mr. Copland became president and manager of the Detroit Gear & Machine Co., with which he remained until 1926, when he resigned to establish The Copland Gear Lapping Syudicate. He made many contributions to the gear making industry as an inventor and manufacturer, one of the most important being a new method for quantity production of relatively quiet interchangeable gears.

Mr. Copland became a member of the A.S.M.E. in 1913. He was also a member of the Society of Automotive Engineers, and active in its standardization work, serving as chairman of the Transmission Division of its Standards Committee from 1917 to 1923, and he belonged to the American Gear Manufacturers Association, which he represented on the Committee on the Standardization of Gears, for which the A.G.M.A. and A.S.M.E. hold joint sponsorship. During the World War he rendered invaluable service on the Truck Standardization Committee of the S.A.E. and War Department.

Mr. Copland is survived by his widow, Charlotte (Campau) Copland, and two daughters.

Robert Henry Corbett

Robert Henry Corbett was born at Jacksonville, Ill., on September 15, 1858. In his early childhood his parents moved to Milwaukee, where he attended the public schools and served an apprenticeship in his father's machine shop. He gained drawing-room and shop experience with R. Davis, 1883-1885, Filer & Stowell, 1885-1888, the Badger Illuminating Company, 1888-1893, and the Nordberg Manufacturing Company, with which he was associated from that time until the illness preceding his death on October 16, 1928.

Mr. Corbett had charge of a great deal of important work for the Nordberg Manufacturing Company, including the erection and testing of pumping engines, air compressors, boilers, etc. Among the installations directed by him were the pumping engines at Washington, D. C., Grand Rapids, Mich., and Wildwood Station, Pa., the mining hoist for the Quincy Mine at Houghton, Mich., a number of large direct-drive engines for rolling mills, and the installation for the American Sheet & Plate Co., at Vandergrift, Pa.

Mr. Corbett is survived by one son, a student in mining engineering at the University of Wisconsin. Mrs. Corbett died in 1920.

Mr. Corbett became a member of the A.S.M.E. in 1904.

Charles Ives Corp

Charles Ives Corp, for seventeen years a member of the faculty of the Department of Hydraulic and Sanitary Engineering, of the College of Engineering, University of Wisconsin, died on April 28, 1928, after an illness of nearly four months with acute leucemia.

Professor Corp was born at Nickerson, Kan., on December 12, 1879, received his early education in the schools of that city, and was graduated from Nickerson Normal School in 1899, and from the University of Kansas, with a B.S. in M.E., in 1903. In 1911 he received his M.S. in M.E. from the University of Wisconsin, and in 1923, the degree of mechanical engineer.

Before entering the teaching profession Mr. Corp assisted in drawing the plans for the plant of the Ellsworth Salt Company and had charge of installation and starting of machinery for the plant. He was then associated for a time with Mr. F. Corp, Hutchinson, Kan., in the management of his contract and repair business.

In 1904, he became assistant professor of mechanical engineering at the University of Kansas, Lawrence, Kan., and from 1907 to 1912 was in charge of testing of materials and hydraulic laboratories there. In 1910 and 1911, on leave of absence from the University of Kansas, he served as research assistant in hydraulics at the University of Wisconsin. In 1912 he became permanently connected with the latter university as assistant professor of hydraulic engineering and in charge of hydraulic laboratory and research work. He was promoted to associate professor in 1915 and in 1920 became a full professor.

During the World War Professor Corp served as captain in the Sanitary Corps, first as Camp Sanitary Inspector at Camp Kearney, Cal., and later as a member of the staff of the Department Surgeon, Western Department. Following the War he was commissioned captain of the Engineers' Reserve Corps and in 1923 was promoted to major. He was a very active member of the Madison Chapter, Reserve Officers' Association, serving as president and director. He also helped to organize the state association in Wisconsin, and served as its first president and later as a director. Twice he represented Wisconsin as a National Council member, attending national conventions of the Reserve Officers' Association, and early in 1927 he represented the Sixth Corps Area as a member of the special committee convened at Washington to work out a modification of the War Department policies affecting the Reserves. In 1927-1928 he served as Corps Area Vice-President of the National Association. He commanded the First Battalion of the 346th Engineers Reserve Regiment.

Professor Corp became a junior member of the A.S.M.E. in 1904 and was promoted to full membership in 1915. He was elected president of the Engineering Society of Wisconsin in 1921, and secretary-treasurer in 1926, which position he filled until shortly before his death. He was also a member of the Society for the Promotion of Engineering Education, the Technical Club of Madison, and of various university clubs, societies, and committees. He belonged to the Congregational Church.

Professor Corp contributed numerous articles to technical publications and in 1922 issued an important bulletin on the loss of head in valves and pipes from one-half to twelve inches in diameter, setting forth the results of extensive research.

In 1905 Mr. Corp. married Georgia Metzger, of Stafford, Kan., by whom he is survived, and also by a son and a daughter.

David H. Darrin

David H. Darrin was born at Addison, Steuben County, N. Y., April 22, 1867, and died March 29, 1928. He was graduated from the Addison Union School, Addison, N. Y., and after acquiring some experience as electrician and engineer's assistant with E. S. Chatfield, of Addison, entered the employ of the United States Electric Light and Power Company, Elmira, N. Y. In 1886 he was transferred to Buffalo, N. Y., in charge of workmen installing arc lighting throughout the northern section of Buffalo and in charge of the lighting station at Mohawk Street, Buffalo. About 1890 he was made superintendent of installation of isolated electric light systems of the Little, Macdonald Electric Supply Company. He remained here for two years when he went into business for himself as contracting engineer installing electric light systems and similar electric installations. In 1895 he moved to New York, N. Y., where he engaged in the installation of motors and elevators. In 1901 he bought the Automatic Switch Company, of Baltimore, Md., and New York, manufacturers of electrical controlling devices for motors, and became its president, and chief designer and engineer. In 1902 he became president of the D. H. Darrin Company, elevator manufacturers, New York, and continued in this position until 1907. At the time of his death he was president of the Automatic Switch Company.

Mr. Darrin designed many automatic devices and was an expert on magnets.

He was a member of the General Society of Mechanics and Tradesmen and of the A.S.M.E., which he joined in 1892. He belonged to several clubs and was a 32d degree Mason.

James Edgar Denton

James Edgar Denton, professor emeritus of Engineering Practice, Stevens Institute of Technology, died at his home in Maplewood, N. J., on July 22, 1928. He had been bedridden for about fifteen years, first only partially, and finally to a point where paralysis made it impossible for him to move without assistance. He was obliged to retire from the Institute in 1911.

Dr. Henry Morton, when president of the Stevens Institute of Technology, believed that some of the professors should keep in active touch with the outside world. He encouraged Dr. Denton to conduct a number of researches and also to do commercial work in addition to his teaching. Dr. Morton established what was called the Department of Tests, and much of Dr. Denton's work was done under this department. This and other work served as the basis of a number of reports, and of scientific papers, presented to engineering societies. He made tests on early forms of steam turbines, and was among the first to appreciate the possibilities and to predict the supremacy of the steam turbine. His early work in the field of refrigeration and the careful tests he made of refrigerating plants would in themselves serve to perpetuate his name, as would also his work on lubrication and lubricants. He was associated in the development of the automobile at such an early day that those backing the enterprise did not appreciate the value of many new features which were developed and which are now embodied in standard constructions. He and his classmate and lifelong friend, Prof. Samuel D. Graydon, formed a copartnership and operated a machine shop under the name of the Graydon & Denton Manufacturing Co. for the manufacture of special machinery. He constructed a section of the New York Aqueduct, where he put in many strenuous hours in tunneling through rock that was difficult to blast and where many adverse conditions were met and overcome. He designed a rock drill especially suitable for the work that made a record for the most rapid rate of progress. He cooperated with Prof. Wm. A. Rogers and with Geo. M. Bond in establishing standards of length for this country.

James Edgar Denton was born of New England parents, in 1855, at Piermont, N. Y., where his father was employed as a master blacksmith of the Erie Railroad.

In 1858 the family moved to Cambridgeport, Mass., and subsequently settled in Brighton, Mass., in whose public schools the son received his education up to about twelve years of age. He was then withdrawn from school for a time, and worked for a year in a sewing-machine repair shop in Boston. After the Civil War the family removed to Jersey City where he spent two years in public school. He next attended the Bryant & Stratton Business College in New York and in 1871 entered Stevens Institute as a member of its first regular class, with which he was graduated in 1875.

After graduation he entered the personal service of Professor Thurston, then occupying the Chair of Mechanical Engineering at the Institute, to take charge of the testing work carried on by Professor Thurston as a separate department known as the Mechanical Laboratory. To this work he added, in 1878, the instruction in mathematics.

In 1879, during about a year's illness of Professor Thurston, he took temporary charge of the Engineering Department, and organized a systematic course of shop practice.

In 1880 Mr. Denton laid befor Dr. Morton a plan for supplementing the theoretical instruction in engineering by a series of experimental exercises designed to give the student an opportunity of testing for himself the truth of the principles and formulas which the textbooks represent as governing the design and operation of practical machinery. This led to the organization of the course of experimental exercises given to the senior students in the summer or preliminary term of the Institute, which was commenced with the class of 1881 in the summer of 1880, and was the first systematic effort to provide a course of instruction of this kind, aiming to cover examples of all the principal applications of the theoretical matter included in mechanical engineering courses.

In the management of this department Prof. D. S. Jacobus became associated with him, and they developed its resources together until 1898, when Professor Denton succeeded Professor Wood in the Chair of Mechanical Engineering. He received the honorary degree of Doctor of Engineering from Stevens in 1906.

Dr. Denton was life member of the American Society of Mechanical Engineers, which he joined in 1881, and served as manager from 1889 to 1892. He was also a member of the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Institute of Electrical Engineers, American Association for the Advancement of Science, Society for the Promotion of Engineering Education, Society of Naval Architects and Marine Engineers, New England Water Works Association, Engineers' Club of New York, and Delta Tau Delta fraternity, as well as of the Baltusrol, Morris County, and Madison golf clubs. He was also a member of the World's Fair Commission on the Jury of Awards in Engineering at Chicago in 1893, and at St. Louis in 1904.

Dr. Denton is survived by a son and a daughter.

Richard Devens

Richard Devens, whose death occurred on November 3, 1928, was born on April 8, 1866, at Charlestown, Mass. After attending the public schools in Boston he entered the Massachusetts Institute of Technology, from which he received a B.S. degree in 1888.

Mr. Devens spent the following three years in the factory of the Clinton Wirecloth Company, Clinton, Mass., and then entered the shop and drafting-room of the crane department of the Yale & Towne Mfg. Co., Stamford, Conn. In 1893 he became signal engineer for the Hall Signal Company, New York and Chicago, resigning in 1896 to join the Weber Railway Joint Company, New York, as engineer. Two years later he took charge of the London office of the Brown Hoisting Machinery Company, of Cleveland, Ohio, and later he was appointed manager of the eastern office, in New York. At the time of his death he was connected with the Link-Belt Company, New York, as sales engineer.

Mr. Devens became a member of the A.S.M.E. in 1913, and also belonged to a number of clubs in New York and vicinity. He is survived by his widow.

Alberto de Verástegui

Alberto de Verástegui, managing director of the export department of the Babcock & Wilcox Co., of New York, N. Y., died on April 28, 1928, at San Sebastian, Spain. He was born at Santander, Spain, on October 27, 1847, and received his technical education in the Central School of Paris, France. Because of ill health he first took up a seafaring career and he visited practically all of the important ports of the world, eventually becoming a ship master. He gained considerable knowledge of marine machinery. For some time he was connected with the steamship company in Havana, Cuba, known as Empressa de Vapores Cubanos de Sobrinos de Herrera, in various capacities, principally dealing with marine engineering. In 1883 he became associated with the Babcock & Wilcox Co., as representative in Cuba, where he remained a number of years. He specialized in the development of furnaces in connection with steam boilers for the burning of green bagasse (the refuse of sugar cane) as it comes directly from the mills or crushers instead of sun-drying it before feeding to the furnaces.

He became a member of the A.S.M.E. in 1889. He was also a charter member of the Automobile Club of America. He is survived by his widow and two daughters, all of whom now reside in Spain.

William Livingston D'Olier

William Livingston D'Olier was found early on the morning of September 2, 1928, with a bullet wound in the right temple which it was not believed could have been self-inflicted. Mr. D'Olier, president of the Sanitation Corporation, New York, N. Y., and a witness in a Queens borough sewer inquiry, left home the previous day expecting to attend a meeting in Queens that evening. His body was found near the Mount Zion Cemetery.

Mr. D'Olier was born on December 9, 1871, at Philadelphia, Pa., where he received his education. After completing his schooling he became connected with the firm of Wm. D'Olier & Co., cotton merchants and manufacturers, with which he remained until 1894. During the last two years of this time he was in charge of engineering work connected with manufacturing.

In 1894 Mr. D'Olier entered the D'Olier Electric Company. Two years later he organized the D'Olier Engineering Company, of which he was president and general manager. In 1914 he became president of the D'Olier Centrifugal Pump & Machine Company. Some years later he located in New York as chief engineer for this concern and in 1926 became connected with the Sanitation Corporation.

Improvements on hydro-extractors and centrifugal machines for use in various industries and machinery for steam, electric, and hydraulic plants were designed and built by Mr. D'Olier for both government and commercial use.

Mr. D'Olier became a member of the A.S.M.E. in 1911. He also belonged to the Albany Society of Engineers, American Society for Municipal Improvements, American Society for Testing Materials, Engineers Society of Northeastern Pennsylvania, Permanent International Association of Navigation Congresses, and several clubs. He is survived by his widow, Lavinia L. D'Olier.

Albert Greene Duncan

Albert Greene Duncan, a member of the insurance firm of John Paulding Meade Company, director in numerous manufacturing companies, and former president of the National Association of Cotton Manufacturers, died at his home in Brookline on February 10, 1928, after only two days' illness.

Mr. Duncan was born in Cleveland, Ohio, on December 12, 1868, the son of Rev. Samuel White Duncan and Mrs. Sarah (Greene) Duncan. He was graduated with an A.B. degree from the University of Rochester in 1891. After a short time as reporter on the *Democrat and Chronicle*, Rochester, and a period with Fay and Burbank, consulting engineers, Boston, he entered the employ of Westinghouse, Church, Kerr & Co., New York and Boston. He remained with this concern until 1897, working on drafting and construction for power and lighting plants, in New York, Montreal, Troy, Boston, and other cities. He was then associated with the Payne Engineering Company, of New York, as secretary and treasurer.

In 1898 Mr. Duncan became treasurer of the Deane Steam Pump Company, Holyoke, Mass. Following that connection he engaged in cotton manufacturing as assistant treasurer of the Dwight Mfg. Co., Chicopee, Mass., and Alabama City, Ala., in special charge of construction and manufacturing, from 1900 to 1903. He then became treasurer of the Chicopee Mfg. Co., for which he rearranged and equipped mills, increased the water power developments, and worked out the application of individual motors to cotton mill machinery. He served the company until 1914, and during the latter part of this period, from 1910 on, was also treasurer for the Harmony Mills, manufacturers of cotton cloth, in Cohoes, N. Y., with which he remained until 1925. From that time he was a partner and vice-president of the firm of John Paulding Meade Company. He also served as director of the Bailey Meter Company, and the New England Waste Company.

Mr. Duncan served his industry and the public in many ways. He was a director of the Boston Chamber of Commerce from 1909 to 1914; a member of the board of managers of the Boston Dispensary since 1917; a member of the Massachusetts public safety committee, 1917-1919, and of Government committees on equipment and supplies for troops in 1917; chairman, subcommittee on power plant economy, for the New England Fuel Administration, 1918-1919; and representative of the Alien Property Custodian as president and director of the New England Waste Company, the American Products Company, the American Linters Company, the Overseas Trading Company, and W. Wolf & Sons, from 1918 to 1924.

Mr. Duncan served as delegate to the Pan-American Financial Conference at Washington in 1915, and the Second Pan-American Scientific Congress there the following year. He was president of the National Association of Cotton Manufacturers in 1914-1916, and had represented the association on the National Industrial Conference Board since that time. He was treasurer of the Board in 1920-1922. He had also been a director of the Textile Alliance since 1915, and a member of the executive committee of the World's Cotton Conference since 1921. For distinguished service to the cotton industry he was awarded a medal by the National Association of Cotton Manufacturers in 1922.

Mr. Duncan became a member of the A.S.M.E. in 1909. He was also a member of the American Academy of Political and Social Science and the Academy of Political Science, and belonged to many military, social, and university clubs. He was the author of several papers on textile manufacturing and patriotic subjects. He had accumulated one of the finest private libraries in Boston. He is survived by his widow, Cora (Hathaway) Duncan, whom he married on October 10, 1922.

William Charles Lawson Eglin

William Charles Lawson Eglin, president of the Franklin Institute and vice-president and chief engineer of the Philadelphia Electric Company, died on February 7, 1928. Dr. Eglin was born at Glasgow, Scotland, on July 14, 1870. He was educated at Andersonian University, Glasgow. He spent three years with the Woodside Electric Works, Scotland, before coming to the United States in 1888. He entered the employ of the Edison Electric Company in the Philadelphia Electric Company and advanced to the position he held at the time of his death. He was responsible for the development of electric lighting and power in Philadelphia and supervised the engineering features involved in the unification of the various electric lighting companies of the city. He designed the generating plant of this company and the various sub-stations. Just before his death he was engaged in superintending the construction of the Philadelphia Electric Company's hydro-electric project at Conowingo, Maryland.

Mr. Eglin belonged to the Union League, of which he was a director, the Masonic fraternity, and many clubs in Philadelphia and other cities. He became a member of the A.S.M.E. in 1915.

Harvey Clark Fairbank

Harvey Clark Fairbank, of the Turbine Sales Department of the General Electric Company, Schenectady, N. Y., died at his home in Schenectady on September 19, 1928.

Mr. Fairbank was born at Jamestown, N. Y., on April 18, 1881. He was graduated from Cornell University in 1903 with the degree of A.B. and received his M.E. in 1905. He began work on steam tests for the General Electric Company the following fall. In 1906 and 1907 he was in charge of the Experimental Turbine Calculating Room, and subsequently of commercial acceptance tests, both at Schenectady and in the power houses of customers of the company. In September, 1908, he was transferred to the Turbine Sales Department, and remained in that department on special engineering sales work until his death. His work took him to all parts of this country and abroad on special assignments.

Mr. Fairbank became a member of the A.S.M.E. in 1925. He also belonged to the American Iron and Steel Institute and several clubs. He is survived by his widow, Eleanor S. Fairbank, and by a son and a daughter.

Thomas F. Flinn

Thomas F. Flinn, a veteran of the Civil War, died at his home in Brooklyn, N. Y., on July 9, 1928, after a brief illness.

Mr. Flinn was born in Drogheda, Ireland, in 1841. Just before the Civil War he came to this country, and when war was declared planned to join the Union Army. His father prevailed upon him to return to Ireland, but later he returned and joined an Irish-American regiment in which he rose to the rank of lieutenant.

Following the war Mr. Flinn acquired shop experience with the Novelty Works, New York, and as foreman and manager for the Flinn Milwright & Machine Co. He was later associated with the New York Motor Vehicle Company, and the Hanbury & Flinn Iron Works, both of Brooklyn. For thirty-seven years he was connected with the Henry R. Worthington Pump & Machinery Corporation. He was works manager at the time of his retirement from active work, and continued to serve the company as consulting engineer.

Mr. Flinn was a pioneer member of the Automobile Club of America and during the latter part of his life conducted experiments resulting in the invention of a steam engine for automobile use. In spite of his age he did experimental work on motors for Army airplanes during the World War.

Mr. Flinn was a life member of the A.S.M.E., which he joined in 1892. He is survived by seven sons and three daughters.

Arthur Ward Fox

Arthur Ward Fox, who died in Hartford, Conn., on March 1, 1928, was born in New Haven, Conn., on March 21, 1882, the son of Simeon J. and Margaret (Farnham) Fox. He received his education in the public schools of New Haven and the Hopkins Grammar School of that city.

In 1906 he entered the employ of the Johns-Pratt Co., Hartford, Conn., manufacturers of compounds, disks, etc., with which he held the successive positions of cost accountant, works manager, assistant treasurer, vice-president, and general manager. In March, 1924, he resigned to become vice-president and general manager of the Billings & Spencer Co., of Hartford, the position which he held at the time of his death. This company manufactured drop forgings, tools, forging machinery, etc.

Mr. Fox was greatly interested in the progress of his city. He had served on the Board of Common Council of Hartford and was a member of the Board of Education at the time of his death. He had been a national director of the National Association of Cost Accountants and a member of the A.I.E.E. and of a number of local clubs. He joined the A.S.M.E. as an associate in 1924.

Rufus T. Gent

Rufus T. Gent, since 1921 general superintendent of the New York Trap Rock Corporation, died of pneumonia in Newburgh, N. Y., on October 4, 1928.

Mr. Gent was born in Rockford, Ill., on April 6, 1879, where he was educated in the public schools. He became interested in electricity and served an apprenticeship with an electrical manufacturing company from 1897 to 1900. For the next two years he was chief electrician for power house construction for the National Contracting Company, Niagara Falls, N. Y. In 1902 he became foreman of the Switchboard Building of the Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa, From 1903 to 1905 he worked on design and sales for the American Talking Scale Company, New York, N. Y. He then entered the employ of the General Electric Company, serving as foreman on power house and substation construction on the New York Central Railroad.

From 1907 to 1912 Mr. Gent was connected with the United Engineering & Construction Co., New York, as chief electrician and master mechanic, and assisted in the construction of tunnels for the Pennsylvania Railroad at New York, the New York State Barge Canal at Lockport, N. Y., and power plants in Cuba and South America. For the next four years he was engaged in the construction of the Mount Royal Tunnel at Montreal. From 1916 to 1921 he was plant engineer for the Hydro-Electric Power Commission of Canada, in charge of plant layout and design, installation and operation, at the Chippawa development.

The New York Trap Rock Company, a comparatively small organization at the time Mr. Gent became connected with it, augmented its production by the construction and purchase of new plants to an annual total of 5,000,000 tons.

Mr. Gent became a member of the A.S.M.E. in 1921. He also belonged to the Engineering Institute of Canada, the Canadian Society of Electrical Engineers, and the American Institute of Electrical Engineers, as well as various clubs.

George Washington Goethals

The death of Major-General George Washington Goethals on January 21, 1928, marked the close of a long and illustrious career and the passing of a great engineer and a great American. The building of the Panama Canal, in which General Goethals succeeded after many distinguished American and European engineers had failed, took seven years, and is regarded as one of the greatest engineering feats of history. Four centuries before it was completed a canal across the Isthmus of Panama had been projected by Balboa and other early Spanish explorers. On the making of this great project an accomplished fact, the fame of General Goethals rests securely.

Born in Brooklyn, N. Y., on June 29, 1858, of Dutch parents, he was educated in the public schools of his native city. He early showed such promise that the principal of the school he attended worked to get him an appointment to the military academy at West Point. The appointment came in 1877 after Goethals had been a student at the College of the City of New York for three years.

The second honor man of his class, he was graduated from West Point in 1880 and was assigned to work in the Cincinnati district to improve the channel of the Ohio River for navigation. He returned to West Point for several years as instructor in astronomy and civil engineering, but in 1889 was sent back to Cincinnati for further work in the Ohio River. There he obtained his first practical working experience in canal-lock and dam construction. Later he was placed in charge of the Muscle Shoals Canal on the Tennessee River and of another canal near Chattanooga. At the beginning of the Spanish War in 1898 he was commissioned a lieutenant-colonel of volunteers and appointed chief engineer of the Porto Rican Army of Occupation, and served throughout the war in that capacity.

After the war he returned to the regular army, and his reputation for engineering skill was so well established that, in 1907, when President Roosevelt decided to take the work of building the Panama Canal out of the hands of civilian engineers and put the responsibility upon the United States Army Corps of Engineers, Goethals was chosen to head the work.

In the face of much criticism and opposition General Goethals favored the abandonment of the sea-level plan and putting the lock plan into effect. Finally a special commission of inquiry upheld him and he proceeded with his work. He made other changes in the plan such as widening the canal that indicated his engineering genius and foresight.

But he shone as an administrator even more than as an engineer. President Roosevelt appointed him not only chief engineer but also chairman of the Canal Commission, and Goethal's greatest achievement was in the administrative function of organizing a highly efficient system for the coordination of all factors — sanitation, excavation, commissary, housing, labor, design, and construction. A man of great force and personality, he inspired complete confidence in the entire organization and brought it together in harmony. The canal job, which had been looked upon in many circles as impossible, came to be known as a model of efficient labor and industrial harmony as well as of sound engineering. So well was the work done that it was finished nearly a year ahead of the time originally contemplated.

The canal reaches from ocean to ocean a distance of forty-seven miles, and to built it several large mountains had to be torn down in the center of the isthmus in order to lower the canal elevation. Millions of tons of earth was carted away to make way for the famous Culebra Cut. Gatun Lake, covering 150 square miles in the interior of the isthmus and eighty-five feet above sea level, had to be built, followed by the building of the Gatun Dam to control the Chagres River. Then came the construction of the great concrete lock on the biggest scale ever attempted. Throughout the seven years of work, until the canal was opened for navigation in 1914, General Goethals directed the job as engineer and administrator. His intimate knowledge of every detail is still talked about in army circles.

After the completion of the canal offers carrying handsome financial inducements began to pour in, but he turned them all down to stay at the Canal Zone as its first civil governor. Two years later he was retired at his own request and returned to the United States where he served as chairman of the board designated to report on the Adamson eight-hour law for railroad employees. In 1917 he was appointed state engineer of New Jersey, but after the United States entered the World War he resigned that post to accept the appointment as manager of the Emergency Fleet Corporation. He was later appointed acting quartermaster-general, U. S. A., and finally was made assistant chief of staff and director of purchase, storage, and traffic. He received the Distinguished Service Medal in 1918, and was also decorated by the French government with the Legion of Honor, Order of Commander, for his war service. In 1919 he resumed his profession of consulting engineer.

For many years he was associated with the Port of New York Authority and had much to do with the plans for the Holland Vehicular Tunnel and the bridge now under construction from New York to Fort Lee, New Jersey.

General Goethals received many honors from scientific and educational institutions. In 1917 he was made an honorary member of the A.S.M.E.

In accordance with his request he was buried in the military cemetery at West Point.

William Freeman Myrick Goss

William Freeman Myrick Goss, retired educator and president of the A.S.M.E. in 1913, died on March 23, 1928, in New York, N. Y., at the age of sixty-eight. He joined the Society in 1886, eventually becoming a life member, and served it as manager from 1900 to 1903, and as vice-president from 1909 to 1911. He was also active in its committee work.

Dr. Goss was born at Barnstable, Mass., on October 7, 1859. In the fall of 1877 he entered the then recently established mechanics arts course at the Massachusetts Institute of Technology. Upon completion of the two-year course he was appointed instructor in practical mechanics at Purdue University, and at once began there the work of establishing shop laboratories. His first class of five students was given instruction in those lines of work in which he himself had just been trained. From a meager beginning, the outlook broadened rapidly. The equipment was extended, the number of students increased, and new shop laboratories were built. In 1883 he became professor of practical mechanics, a title which he held for seven years. When he began, there was no college west of the Alleghany Mountains giving systematic courses in shop practice, and there was no manual-training work in any American high school. He devised courses of practice and developed series of lectures by means of which principles established in the shops could be given wider application. It was a day when school officials were becoming interested in training students in the manual arts, and many distinguished visitors went to see the work of the Purdue laboratories. The great cities of Chicago, Toledo, Louisville, and Indianapolis each in turn sought its aid in the establishment of their manual-training schools. Certain forms of equipment, especially forges and lathes, originally designed and constructed at Purdue, were made and supplied as complete equipment to school boards in distant localities where new courses of shop practice were being organized. In many such ways the work at Purdue had an important part in ushering in an educational movement of unusual significance.

In 1889, after ten years of this work, Dr. Goss was given a leave of absence, and took up his residence in Boston, where he continued from April of that year to a year from the following September. Some work was done at the Massachusetts Institute of Technology, but the greater part of the time was given to self-directed reading and study. In the spring of 1890 he was appointed professor of experimental engineering, and he undertook the active duties of his new office in the fall of that year. Having developed laboratories for elementary training, it was now his task to build laboratories for advanced engineering work. A modest steam-engineering laboratory equipped with a compound Corliss engine and a few testing machines was soon in operation. Plans for an extensive engineering building (Purdue's present engineering laboratory) were developed, and by the fall of 1891 a portion of the building was constructed. A significant part of the equipment of the new laboratory was a locomotive testing plant designed to serve in an experimental study of locomotive problems in much the same way that an experimantal stationary plant could be used in studying the problems of design affecting the performance of stationary engines. This locomotive testing plant was the first of its kind. It was designed in the summer of 1891 while the building which was to contain it was in the process of erection, and was in successful operation in the late fall of the same year. An incident in the process of installing this plant was that of transporting a 100,000-lb. locomotive over the cornfields and highways which intervened between the nearest track and the laboratory, a distance by the course taken of about a mile and a half. The opportunities which were presented to its possessors at once attracted the attention of motive-power men and of steam engineers. So meager was the information concerning the performance of locomotives that every fragment of truth, however simple or easily obtained, at once became a matter of public interest. The evaporative capacity of the locomotive boiler, its efficiency at different rates of power, the power and efficiency of the cylinders, and the effect upon power and efficiency of changes in speed or cut-off were all matters which previous to the introduction of this plant had been but little understood even by those best informed. The behavior of the various parts of the machine as a mechanism and especially the effects produced by the action of the counterbalance in the locomotive drive wheels were all matters concerning which people had theories, but which were first actually developed by the accurate processes of the laboratory at the Purdue plant. Associations of railroad men gave their encouragement and sometimes financial assistance in increasing the output of the plant. The Master Car Builders' Association made the Purdue laboratory its official testing station, and was instrumental in installing there a considerable amount of useful and expensive apparatus. The laboratory became an active center for testing not only locomotives, locomotive fuels, and locomotive lubricants, but also details of car construction such as wheels, axles, draft gears, couplers, and brake shoes. The problems awaiting solution were always numerous, and the professor in charge was kept busy outlining the means to be employed in solving them. He was in the beginning responsible not only for the effective use of the railroad equipment to which reference has already been made, but also for the development of laboratories and courses in materials testing, in hydraulics, and in the general field of theoretical and applied thermodynamics. He erected buildings, purchased and installed equipment, and in many cases the equipment installed was of his design, and he was required to meet the reasonable expectations of an ever-increasing body of students. Hundreds of men, students at Purdue in the early nineties, can testify to the variety of the activities which in their day were in progress in the engineering laboratories.

In 1899 Dr. Goss was again granted a year's leave of absence which he spent in travel and study abroad, chiefly in Germany. Upon his return he was appointed dean of the School of Engineering, an office which he continued to hold throughout the remaining eight years of his residence at Purdue. In 1907 he resigned his position at Purdue, after twenty-eight years of service, to take up what seemed to him the larger and more responsible duties of dean of the College of Engineering of the University of Illinois.

In 1913 Dr. Goss was granted leave of absence from his duties at the University of Illinois to become chief engineer of the Chicago Association of Commerce's Committee on Smoke Abatement and Electrification of Railway Terminals, succeeding Mr. Horace G. Burt. This work involved a detailed study of the extent to which smoke from railway operations constituted a public nuisance and menace to health in the city of Chicago and a detailed study of the cost, technical feasibility, and financial practicability of the complete electrification of the railway terminals of Chicago. A complete report covering these studies was compiled under the direction of Dr. Goss and issued in printed form in December, 1915.

At the conclusion of this work, Dr. Goss resumed his duties as Dean of the College of Engineering at the University of Illinois. In May, 1917, he resigned that office, after having completed 38 years of service in university work, to become president of the newly organized Railway Car Manufacturers'

Association, an organization having as members some twenty-four railway-car manufacturing companies located throughout the country. In this capacity he handled important work for the car builders in connection with Government equipment business during the war and throughout the life of the Federal Railroad Administration, as well as many other matters of common interest to the car-building companies.

On August 1, 1925, Dr. Goss retired from active business and after that date resided at Barnstable, Mass., his birthplace.

Dr. Goss was given the honorary degree of Master of Arts by Wabash College in 1888, and the honorary degree of Doctor of Engineering by the University of Illinois in 1904. He was a member of the American Society for Testing Materials and of the Society for the Promotion of Engineering Education from their organization; a member of the Executive Committee of the National Advisory Board on Fuels and Structural Materials, of the Jury of Awards in the Transportation Department of the World's Fair of Chicago in 1893, of the Master Car Builders' Association, of the Master Mechanics' Association, of the Illinois Academy of Science, and of the Western Society of Engineers. He was a fellow of the American Society for the Advancement of Science, a member and past-president of the Western Railway Club, a member of the Railroad Club of New York, and also the chairman of the Advisory Committee organized by the Pennsylvania Railway Company to direct its work in locomotive testing at the Louisiana Purchase Exposition. For many years he was a contributing editor to the *Railroad Gazette.* His contributions to technical literature were numerous. Probably his best-known work is that which deals with the locomotive. His books "Locomotive Performance" and "Locomotive Sparks" are records of personal researches which are known to most railroad men and to most students of locomotive design. Numerous researches conducted under the patronage of various associations are available only in the proceedings of these associations. Besides these, two noteworthy pieces of work were done under the patronage of the Carnegie Institution of Washington, the results of which were presented in two volumes, one entitled "High Steam Pressures in Locomotive Service," and the other, "Superheated Steam in Locomotive Service."

William Shattuck Gould

William Shattuck Gould was born on January 26, 1865, at Owosso, Mich. He attended the University of Michigan, class of 1887, and took special work under Professor McCormick of Armour Institute.

Mr. Gould founded and served as president of the Fuel Engineering Company of New York from 1907 to 1928. Prior to that time he was engaged principally in the management of large office building properties in Buffalo, Chicago, and New York. As head of the Fuel Engineering Company, a consulting organization specializing in matters relating to coal selection and steam generation, he made extensive investigations of fuel resources and coal fields all over the country.

Mr. Gould became an associate of the A.S.M.E. in 1914 and a member in 1920. He was also a member of the American Society for Testing Materials. He died on January 23, 1928.

Albert Weston Grant, Jr.

Albert Weston Grant, Jr., whose death occurred on April 5, 1928, was born on March 2, 1887, at Norfolk, Va., the son of Admiral Albert Weston Grant, U. S. N., retired. He received a B.S. from Virginia Polytechnic Institute in 1906, an M.E. in 1907, and his M.E. from Cornell University in 1909. He then took an apprentice course in forge shop and hydraulic press plant work at the Midvale Steel Company, and from that time until October, 1911, was connected successively with the Illinois Steel Company, Chicago, Ill., the Western Electric Company, Hawthorne, Ill., and the Baldwin Locomotive Works, Eddystone, Pa., gaining a varied experience.

For the next five years Mr. Grant was associated with the United Gas Improvement Company, Philadelphia, Pa., principally in experimental work.

In 1916 he became field operator for the Koppers Company, Pittsburgh, Pa., and remained with that firm, in various capacities, until his death. His work dealt largely with the improvement of the design and efficiency of the plants of the company, with particular reference to ammonia concentrating and sulphate of ammonia plants, and benzol and toluol recovery plants.

Mr. Grant became a junior member of the A.S.M.E. in 1913, was promoted to associate membership in 1916, and received full membership in 1919. He married Alice Preston, at Roanoke, Va., on October 17, 1914, and is survived by her and six children, as well as by his parents.

George Edward Greenleaf

George Edward Greenleaf was born on December 20, 1859, at New Haven, Conn., where he received his education. He was employed as a draftsman for several years at the South Norwalk Iron Works, South Norwalk, Conn., and for a short time was with the Philadelphia & Reading R. R. Co., at Reading, Pa. In 1882 he was located with the Hendey Machine Company, at Torrington, Conn. He next spent four years as draftsman for the Winchester Repeating Arms Company, New Haven, Conn.

In 1887 Mr. Greenleaf moved to Plainfield, and entered the employ of the Pond Machine Tool Company, of the Niles-Bement-Pond Company, as assistant engineer. He was later promoted to the position of chief mechanical engineer, and remained with the firm in this capacity until 1927, when the plant was sold, and Mr. Greenleaf retired from business. He died on December 4, 1928.

Mr. Greenleaf became a member of the A.S.M.E. in 1892. During the World War he served in the Ordnance Department, with the rank of major.

James Lawrence Hagy

James Lawrence Hagy, instructor since 1919 in mechanical drafting and machine design at the Central High School of Philadelphia, Pa., died on March 5, 1928. Mr. Hagy was born on October 30, 1876, at Boyertown, Pa. He attended the Central Manual Training High School in Philadelphia, and was graduated from the University of Pennsylvania in 1899 with a B.S. in engineering. Later he attended the Wharton School of Finance of the University, and in 1921 he received an A.M. degree from its Graduate School in Education. He also took special courses at Temple University, Drexel Institute, and the Pennsylvania Museum and School of Industrial Art.

His earliest engineering experience was acquired during the summer vacations during his college years with the firms of Thompson & Allen and Walker & Kepler Co., Philadelphia, as draftsman and estimator. In 1899 and 1900 he was engineer and draftsman for the Pennsylvania Iron Works, and the Link Belt Engineering Company, Philadelphia. From that time until 1907 he held a similar position with the Electric Storage Battery Company, Philadelphia. The following two years were spent in the same capacity in the Bureau of Filtration of the City of Philadelphia.

After brief connections with the Harrison Safety Boiler Works Co., Philadelphia, as designing draftsman, and with the Walton Company, Hartford, Conn., Mr. Hagy returned to the employ of the City of Philadelphia as chief draftsman in the Electrical Bureau, remaining in this position from 1910 to 1915. In the latter year he began his teaching experience as instructor of mechanical drafting and machine design in the Philadelphia Trades School, where he remained until 1919.

Mr. Hagy joined the A.S.M.E. as a junior in 1901 and became a member in 1916. He also belonged to a number of clubs in Philadelphia, and to the Masonic fraternity, in which he was a Shriner. He married Martha R. Ackley in 1917 and is survived by her and two children.

Richard Augustus Hale

Richard Augustus Hale, who died on December 17, 1928, was born at Lowell, Mass., on December 3, 1852. He attended the public schools in Lowell and after graduation from high school in 1869, entered the office of Hiram F. Mills, hydraulic engineer, in Boston. After a few months he was transferred to Lawrence, Mass., as assistant engineer to Mr. Mills, who had been appointed chief engineer for the Essex Company.

Mr. Hale engaged in general hydraulic work with Mr. Mills until 1873, when he entered the Massachusetts Institute of Technology, from which he was graduated in 1877. He then returned to the Essex Company as assistant engineer. In 1866 he became principal assistant engineer, and remained with the firm in that capacity until his death. In addition to his work in Lawrence Mr. Hale investigated and made reports on water powers throughout New England, New York, and Delaware, and acted as consultant on hydraulic matters for various companies. He appeared before legislatures in several states on matters relating to the development of water power, and presented expert testimony at hearings in many cases of water diversion. In January, 1894, he was appointed on the Lawrence Park Commission, where he served for twelve years, the last six as chairman of the board.

Among the organizations to which Mr. Hale belonged were the A.S.M.E., of which he became a member in 1917, the American Society of Civil Engineers, the Boston Society of Civil Engineers, of which he served as director for two years, the New England Water Works Association, the National Geographic Society, American Forestry Association, and Massachusetts Forestry Association. His favorite diversions were golf and photography.

Mr. Hale married Arabella Johnson Plummer on October 28, 1880. Five of their six children survive him.

Alexander Daniel Hall

Alexander Daniel Hall, production manager of the American Manufacturing Company, Chattanooga, Tenn., died on March 24, 1928. Mr. Hall was born at Lexington, Ky., on December 9, 1896, where he attended the public schools. He was given a B.S. in mechanical engineering at the University of Kentucky in 1919. During his summer vacations while in college he worked for the Willys-Overland Company, Toledo, Ohio, the Goodyear Tire & Rubber Co., Akron, Ohio, and the Chesapeake & Ohio R. R. Co., Richmond, Va.

In 1919 Mr. Hall became mechanical engineer for the Ford Motor Company, Detroit, Mich., and was associated with this company in various capacities for several years. He returned to the University of Kentucky as an instructor in the Engineering Department until 1925, when he accepted the position which he held at the time of his death.

Mr. Hall became a junior member of the A.S.M.E. in 1920. His widow, Elizabeth S. Hall, and one son, survive him.

James Wilfred Harris

James Wilfred Harris was born on May 10, 1874, and died on January 14, 1928. He was educated at King Edward's School, Birmingham, and received his technical education at Birmingham and Finsbury Colleges. He served as apprentice at Piercy's Engine Works, Birmingham, and at the Electric Construction Company, Wolverhampton. At the latter place he went through the shops, drawing office, and testing and estimating departments and was for two years engaged in central station and street railway work.

After leaving the Electric Construction Company, he spent two years in inspecting engineering work in Egypt, India, Burmah, China, and Japan. He then spent twelve months on the Pacific coast of America, inspecting high tension, hydroelectric long-distance transmission projects. He was engineer in charge of a shift on the West Kootenay Electric Supply Company, which transmitted power from the Kootenay River to the surrounding mines and towns within a radius of fifty to sixty miles.

He then went to Pittsburgh and spent some time in the works and power houses of the Westinghouse Electric and Manufacturing Company. He was sent to England to install the power and hydraulic plant and machine tools at the Westinghouse Works at Trafford Park, Manchester. He was engineer of works having charge of all buildings, railway tracks, power plant, machine tools, and iron and steel foundries for several years.

He was afterwards appointed electrical engineer for the Dominion Iron and Steel Company for Sydney, Nova Scotia, and had charge of the electrical and mechanical plants.

From 1909 until his death he was joint governing director of Alfred Wiseman, Ltd., Birmingham, England.

He was a member of the Institution of Civil Engineers, the Institution of Electrical Engineers, and the American Institute of Electrical Engineers. He had been a member of the A.S.M.E. since 1905.

Harry M. Haven

Harry M. Haven was born at Somerville, Mass., on June 7, 1871, and died on February 6, 1928. He was graduated from the Massachusetts Institute of Technology in 1895 and entered the employ of the Quincy Market Cold Storage Company, Boston, where his work included building, power house administration, and the establishment of a street system for distributing artificial refrigeration. In 1904 he severed his connection with this concern to join the engineering firm of Dean & Main, Boston, engaged in the design of cold storage warehouses and power plants, and the adaptation of refrigeration to all industries.

In 1910 Mr. Haven became a partner in the engineering firm with F. W. Dean and W. W. Crosby which engaged in the design and construction of steam power plants, paper mills, fish freezing plants and chocolate factories. In 1914 with W. W. Crosby he formed the partnership known as Haven & Crosby which continued until the formation of a new partnership, H. M. Haven & A. T. Hopkins, Inc., in 1922. This partnership included E. L. C. Clark. During this time Mr. Haven was engaged in making of appraisals of mill properties, including that of the Amoskeag Manufacturing Company, Manchester, N. H., valued at $42,000.000. He was also interested in the building and refrigeration installations of dairies, chocolate factories, bakeries, and other industries in New England and other sections of the country.

Mr. Haven became a member of the A.S.M.E. in 1904.

Frank H. Hayes

Frank H. Hayes, president of the Hayes Pump & Machinery Co., died on July 14, 1928. Mr. Hayes was well-known as an engineer throughout the East and Middle West. He had been engaged in the pumping machinery business in Boston for forty-five years. He became a member of the A.S.M.E. in 1906. He also belonged to the New England Water Works Association.

Mr. Hayes was born at Derby, Conn., on November 10, 1848. After completing his high school education he served an apprenticeship with John Whitlock, in general machine-shop and engineering work. For about five years he was employed by Ball & Jewell, New York. He spent two years in stationary locomotive and marine engineering work, and ten years in locomotive work on the Naugatuck Railroad. He directed the erection of a water works plant for the Lowell Fertilizer Co., Lowell, Mass., installed a pumping engine for the City of Haverhill, Mass., and did general engineering work for a number of companies in different cities in New England.

For some years Mr. Hayes was connected with the Deane Steam Pump Company, of Holyoke, Mass., which later became a part of the International Steam Pump Company. In 1883 he was appointed manager of the Boston office of the company. He was also New England manager of the Platt Iron Works Company of Dayton, Ohio, for a number of years, and supervised the erection of complete pumping stations in several cities. He organized the Hayes Pump & Machinery Co. in 1900.

Mr. Hayes is survived by his widow, Grace (Watkins) Hayes, whom he married in 1878, and by four sons.

Walter Alfred Hearn

Walter Alfred Hearn, who became an associate of the A.S.M.E. early in 1928, died on December 20, 1928.

Mr. Hearn was born in Baltimore, Md. on April 3, 1865. He was educated in the public schools there and at Calvert Hall College, Maryland. His first position was with the Baltimore branch of the Wheeler & Wilson Mfg. Co., where he remained for about a year. The following year he rebuilt several kinds of sewing machines for Jos. B. Millington & Co. About this time his first inventions were completed. They were a combination lock, and a massage roller.

In 1887 Mr. Hearn originated the office towel service and invented a combination cabinet for clean and soiled towels. The next year he originated the window cleaning business. He was president of the National Window and Office Cleaning Company, the largest establishment of its kind in the country.

In 1904 Mr. Hearn began the invention of safety devices for window cleaners. His first invention in this field was a safety shoe to prevent the cleaner's ladder from slipping. Various types were made for use on ice, concrete, or hardwood flooring. Later he invented several devices, such as anchors, safety belts,, etc., to prevent cleaners from falling while working on outside window sills. The National Safety Appliances Corporation, of which Mr. Hearn was also president, was established to market these devices.

An air displacement and positive vacuum machine to clean homes, offices, etc., by the air process was invented by Mr. Hearn about the year 1905, and other things were designed by him from time to time.

Mr. Hearn was a Scottish Rite Mason and belonged to a number of business organizations in Baltimore and Washington.

Robert Barry Hickey

Robert Barry Hickey was born in Pittsfield, Mass. on December 9, 1870, and died in St. Louis, Mo., on June 13, 1928.

His education consisted of five grades in grammar school, after which, at the age of eleven, he was obliged to go to work to help support a family of eight. In his eighteenth year he was bound out for three years to the Bullard Machine Tool Company, Bridgeport, Conn. From a weekly allowance of twenty-five cents for books he purchased what works he could, and spent his evenings in studying the fundamentals of engineering.

After his apprenticeship was completed Mr. Hickey worked at various shops in Bridgeport for a few years, and then in Boston from 1896 to 1901 as tool and die maker, first for the Jackson Typewriter Company and later for the National Sewing Machine Company. In 1901 he went to St. Louis as tool and die maker for the Burroughs Adding Machine Company. In the following year he was given charge of the department, and in 1904 moved with the company to Detroit. During these years he pursued his engineering studies with the International Correspondence School.

In 1905 Mr. Hickey opened the Minty-Hickey Tool & Die Works in Detroit, where he designed and manufactured tools and dies for the Burroughs and other companies. In 1907 he gave up this business and returned to St. Louis, as foreman of the toolroom of the Century Electric Company. At the time of his death he had become chief mechanical engineer for this company.

Mr. Hickey became a member of the A.S.M.E. in 1920.

Frederick Matthew Hitchcock

Frederick Matthew Hitchcock was born at Westfield, Mass., on October 25, 1873. He was graduated from Worcester Polytechnic Institute with an S.B.

in mechanical engineering in 1895, and became machine tool draftsman for the Woodward & Powell Planer Company of Worcester. In 1897 he entered the employ of the Rand Drill Company, manufacturers of compressed air machinery. He was located at the Tarrytown, N. Y., factory for three years, having charge of the cost department, making estimates, and handling engineering correspondence. In the spring of 1900 he was transferred to the home office of the company in New York, N. Y., as an engineer-salesman and later was put in charge of the sales department. When the company was merged in the Ingersoll-Rand Company in 1905 he continued in the employ of the new firm as engineering correspondent. The following year he was made assistant to the general manager of sales.

Severing his connection with the Ingersoll-Rand Company in 1908 he spent two years in mining enterprises and travel. He then became works manager for the Dexter Folder Company, New York and Pearl River, N. Y., in full charge of manufacturing. In 1914 he was appointed a vice-president of the company. He resigned in 1918 and served as mechanical engineer in the Inspection Division of the Ordnance Department, Washington.

During part of 1919 and from March, 1920, until his death, Mr. Hitchcock had been on the staff of the National Industrial Conference Board, New York, N. Y.

Mr. Hitchcock became a junior member of the A.S.M.E. in 1899 and received full membership in 1907. He as a 32d degree Mason, and served as president of the First National Bank of Pearl River, N. Y. from 1915 to 1919. His death occurred on July 13, 1928.

Charles P. Howard

Charles P. Howard, president of James L. Howard & Co., Inc., died at his home at Hartford, Conn., on March 6, 1928. He was born at Hartford, on March 21, 1853, a son of the late Charles F. and Catherine (Patton) Howard. In 1874 he was graduated from the Massachusetts Institute of Technology and he immediately became associated with James L. Howard & Co., with whom he spent all of his business life except a year or two when he worked at the Colts Patent Fire Arms Manufacturing Company. In designing railway car door locks he was most proficient and his name is well-known generally throughout the railroad and car building industry.

Mr. Howard was always interested in and was a great student of astronomy, and made object glasses of great precision for his own telescopes. He became an authority on the subject and at times was called upon for advice by the foremost telescope makers in the country. He published his observations of the solar eclipse in Winton, N. C., and his plotting of the orbit of Sirius is considered the best yet produced.

He became a member of the A.S.M.E. in 1880.

Frederick Huber

Frederick Huber was born in Germany on July 11, 1881. His parents came to the United States, locating at Downingtown, Pa., when he was two years of age. After graduating from the Downingtown High School, Mr. Huber took a business course and also an evening course in mechanical engineering in Philadelphia.

From 1900 to 1909 he was engaged in tool and die work and design, and drafting, with different concerns. He then did substitute teaching in machine-shop practice at the Stuyvesant High School in New York for a short time, and in 1910 located in Bridgeport, Pa., as machine-shop foreman for the Wilkinson Mfg. Co. In 1911 he organized the firm of Huber & Huber, Baltimore, Md., building special machinery models and doing experimental work. Three years later he organized and became president of the Maryland Motor Company, Inc., taking over the machine business of the former organization, and branching out into the automobile repair business.

In 1916 Mr. Huber sold his interest in this company to accept the position of superintendent of the stoker department of the Flynn & Emrich Co. Working in part with his brother, Charles J. Huber, chief engineer for Flynn & Emrich Co., he designed the Huber stoker, and developed methods for securing greater combustion economy.

Mr. Huber became an associate member of the A.S.M.E. in 1922. His death occurred on June 3, 1928.

George Francis Hutchins

George Francis Hutchins, a Worcester, Mass., inventor and engineer, and a veteran of the Civil War, died at his home on December 12, 1928. Mr. Hutchins was born at Hepburn, Pa., on October 5, 1841, the son of Charles and Harriet (Hunt) Hutchins. His father became affiliated with the Douglas Axe Mfg. Company, Douglas, Mass., as master mechanic, a position filled later by his son, who attended the Douglas High School and spent all his spare time working with his father. In 1880 he entered the shop of Harrington & Heald, manufacturers of bayonets, in Millbury, Mass., and a year later, at the beginning of the Civil War, went to Boston and engaged in the manufacture of Spencer rifles.

Mr. Hutchins enlisted as a drummer boy in the fall of 1862, and remained on duty for the eleven months that the regiment served. He contracted malaria, from which he did not recover for a year. About this time he decided upon civil engineering as a career, and associated himself with Cushing & DeWitt, civil engineers, of Providence, R. I. He planned to take up civil engineering in the West; but following the death of his father he was offered the position of master mechanic for the Douglas Axe Mfg. Company, which he accepted, and held until the death of his mother, four years later.

Again planning to pursue civil engineering Mr. Hutchins was given an opportunity to become superintendent and machinist for loom works opened in Worcester by L. J. Knowles & Bro. He went to Worcester in 1873 and remained with the concern, later reorganized as the Crompton & Knowles Loom Works, until his retirement in 1917. He was constantly engaged in inventing and perfecting many new looms and machines relating to the loom industry, and had taken out ninety-six patents.

Mr. Hutchins was a 32d degree Mason. He became a member of the A.S.M.E. in 1910. He is survived by his widow, Jennie M. (Kettell) Hutchins, and three sons.

Edward Francis Hyde

Edward Francis Hyde was born at Elmira, N. Y., on April 17, 1895. He attended the Saint Peter and Pauls Parochial School, Elmira, the Salamanca, N. Y., High School, and Elmira Academy, and was graduated from Purdue University in 1919 with the degree of Bachelor of Science in chemical engineering.

He entered the engineering department of the Proctor and Gamble Manufacturing Company at Cincinnati, Ohio, as assistant to the steam and power engineer. In 1924 he became master mechanic and plant engineer at the plant operated by the same company at Hamilton, Ontario, Canada. In April, 1927, Mr. Hyde was forced by ill health to accept extended leave of absence, and returned to his home in Elmira, where he died on February 14, 1928.

Mr. Hyde became a junior member of the A.S.M.E. in 1923.

Winthrop Ingersoll

Winthrop Ingersoll, president of The Ingersoll Milling Machine Co., Rockford, Ill., died of pneumonia on December 19, 1928.

Mr. Ingersoll was born in Cleveland, Ohio, on May 28, 1865, and was educated in the public schools there. In the fall of 1886 he formed a partnership with W. R. Eynon to manufacture milling machines. In 1889 he purchased Mr. Eynon's interest and formed The Ingersoll Milling Machine Co., of which he was president. He moved the business from Cleveland to Rockford in the spring of 1891. Under his guidance it grew from a small concern to one of the largest and best known in the industry, doing a widespread business.

In 1887 Mr. Ingersoll married Harriet Caskey, and he is survived by her and two children. One son was killed in the World War and a daughter died from injuries sustained in a taxicab accident.

Mr. Ingersoll was enthusiastic as a baseball fan and player in his early life and later was equally devoted to golf. The Clayton C. Ingersoll Memorial Park, to be used as a public golf links, was given to the city of Rockford in memory of his son, and he was generous of his time in furthering boys' tournaments in the city. He was a former president of the Rockford Country Club and at the time of his death was a director, a post he had held for many years.

Mr. Ingersoll was a director of the Forest City National Bank. During the World War he was county fuel administrator and assisted in the Liberty Loan drives. He was active in church work, and a member of the quartet for some years. He was an Elk, and had been an associate of the A.S.M.E. since 1893.

Leland Frierson James

Leland Frierson James, who died in 1928, was born at Florence, S. C., on August 30, 1872. He attended the U. S. Naval Academy, from which he was graduated in 1894. For the next two years he was a cadet engineer in charge of watch in the engineering department, *U. S. S. Montgomery*. He next spent three years on the *U. S. S. Boston* as senior assistant engineer officer. In 1900 and 1901 he was engaged in hydrographic and topographic surveying on the coast of Cuba. In 1901 he was appointed head of the department of steam engineering at the U. S. Navy Yard at Pensacola, Fla., where he remained until 1904. He then spent two years aboard the *U. S. S. Raleigh* as senior engineer officer and chief engineer. From 1906 to 1909 he was instructor in machine design and experimental engineering at the U. S. Naval Academy. Subsequently he served for two years as navigator and electrical officer on the *U. S. S. West Virginia*, after which he was made captain of the yard and inspector officer, with general supervision over war-time construction, care, preservation, and repair of ships, including the installation of machinery, at the Charleston Navy Yard. He was retired as Commander.

He became a member of the A.S.M.E. in 1924 and also belonged to the American societies of both naval and military engineers. He had contributed articles on modern highway and bridge construction to the *Military Engineer*.

Benjamin Needham Jones

Benjamin Needham Jones was born on April. 1, 1871, at Somerville, N. J. He entered Stevens Institute of Technology with the class of 1893, but left in his junior year to become connected with the Sprague Electric Elevator Company, with which he obtained his drawing-room and shop experience in the New York office and at the Watsessing, N. J., works. From 1898 until August, 1900, he was employed as assistant engineer with the Sprague Electric Co., and the Sprague Elevator Co. He then engaged as electrical engineer with the Marine Engine and Machine Co., Harrison, N. J., in charge of design of controlling apparatus for their electric elevators. In November, 1903, he was made chief engineer in charge of the entire engineering department of the company.

A few years later he became associated with the Otis Elevator Company, which had absorbed the Sprague company, as assistant general superintendent, and remained with that company until his death. He was appointed assistant general manager of the manufacturing and construction department, superintended the construction of the Buffalo works of the company, and served successively as manager of manufacturing, works manager of the Harrison works, and finally general works engineer in the office of the vice-president and general manager.

Mr. Jones held several patents on elevator apparatus, chief among them being a motor operated brake for alternating-current elevator machines. The original elevator in the Washington Monument was installed by him, and patents on the controller of this elevator held by him.

Mr. Jones had been treasurer of the National Metal Trades Association of America since 1920. He was a member of the A.S.M.E., which he joined in 1904, and of the American Institute of Electrical Engineers and the Society of Automotive Engineers. He died on July 4, 1928.

Edward Archie Jones

Edward Archie Jones, president and treasurer of E. D. Jones & Sons Co., Pittsfield, Mass., manufacturers of paper making machinery, died of heart trouble on February 29, 1928.

Mr. Jones was born at East Lee, Mass., in November, 1863, the son of Edward D. G. and Ardilla (Herrick) Jones. He attended the Peekskill Military Academy and was graduated from the Massachusetts Institute of Technology with an S.B. in mechanical engineering in 1887.

Upon graduation Mr. Jones entered the planning department of the E. D. Jones & Sons Co., working on the development of water power and designing machinery for paper and pulp mills. Plans for many mills both in this country and abroad were drawn by him, and the machinery for them designed and manufactured under his supervision. He was appointed president and treasurer of the company in 1905.

Mr. Jones was vice-president and director of the Pittsfield National Bank & Trust Company and the Pittsfield Electric Company, vice-president of the Berkshire County Savings Bank, a director of the Berkshire Life Insurance Company, Pittsfield, the Keith Paper Company, Turners Falls, Mass., and the Western Massachusetts Companies, and a trustee of Deerfield Academy. He had served as councilman and alderman in Pittsfield and was frequently mentioned for the mayoralty and other offices. He served for three years as a member of a special water commission in Pittsfield, under the direction of which a million-dollar water system for the city was established. He became a member of the A.S.M.E. in 1914.

Mr. Jones is survived by his widow, Isabel A. Jones, whom he married in 1891. Their son, Charles E., was killed while flying in France during the World War.

Walter Clyde Jones

Walter Clyde Jones, son of Jonathan and Sarah (Buffington) Jones, was born at Pilot Grove, Iowa, on December 27, 1870. He attended the public schools at Keokuk, Iowa, and studied electrical and mechanical engineering at the Iowa State College at Ames, from which he was graduated in 1891. In 1895 he was graduated from the Chicago College of Law, a branch of Lake Forest University.

Mr. Jones was admitted to the Illinois Bar in 1895, and took up the practice of general and patent law as a member of the firm of Jones, Addington, Ames & Seibold, of Chicago and New York. He was joint author and editor (with the late Keene H. Addington) of Jones & Addington's Annotated Statutes of Illinois, six volumes; Illinois Notes or Cyclopedia of Illinois Law, fifteen volumes; and Appellate Court Reports of Illinois, seventy volumes.

For two terms, 1906 to 1914, Mr. Jones was a member of the Illinois State Senate. He ran as Progressive Republican candidate for Governor of Illinois in 1912. He was the author of the direct primary law of Illinois and the law limiting the hours of labor of women to ten hours a day, and was a leader in the movements for civil service reform and enactment of rules for reformed legislative procedure.

Mr. Jones was one of the founders of the Chicago Electrical Association and its president in 1896. He became a junior member of the A.S.M.E. in 1892, and also belonged to the Franklin Institute of Philadelphia and a number of professional and social clubs.

The death of Mr. Jones occurred on March 28, 1928. His widow, Emma (Boyd) Jones, whom he married in 1896, and three children survive.

Edward Britton Katte

Edward Britton Katte, chief engineer of electric traction for the New York Central Railroad, died at his home at Irvington-on Hudson, N. Y., on July 19, 1928, after a long illness.

Mr. Katte was recognized as one of the outstanding engineers in America in the development of electric transportation on steam railroads. He designed the New York Central's electric locomotives and was an expert on the electrification of terminals. His reputation was such that he was consulted in the construction of the Detroit tunnel and in connection with terminal work at Chicago and Cleveland.

Mr. Katte came from an engineering family. His father was Colonel Walter Katte, for many years chief engineer of the New York Central. His mother was Mrs. Elizabeth Britton Katte, daughter of a former Mayor of St. Louis. He traced his family back to Revolutionary days in Virginia. He was born in St. Louis, Mo., on October 16, 1871.

Mr. Katte received a mechanical engineering degree at Cornell University in 1893 and took a master's degree in engineering a year later. He was an apprentice in the H. R. Worthington shops in Brooklyn until 1896, and was then assistant engineer of the Park Avenue Improvement Commission in Manhattan for two years. In 1898 he joined the New York Central as a draftsman, and rose rapidly to the position he held at the time of his death.

Mr. Katte married Elva King, daughter of the late Thomas M. King, former vice-president of the Baltimore & Ohio Railroad, in 1907, and is survived by her and their two children, a son and a daughter.

In 1895 Mr. Katte joined the A.S.M.E. as a junior member. He became a full member in 1901, served as manager from 1910 to 1913 and as vice-president from 1913 to 1914, and was ever active in the committee work of the Society. He was a fellow of the American Institute of Electrical Engineers, a member of the American Railway Engineering Association, and a former president of the New York Electrical Society. He was formerly one of the governors of the University Club in New York, and belonged to a number of other clubs. He was a warden of St. Barnabas Church at Irvington-on-Hudson.

Alexander Kearney

Alexander Kearney, of Roanoke, Va., superintendent of motive power on the Norfolk & Western Railway, died at the Roanoke Hospital on May 20, 1928, as a result of injuries received from a fall from his horse.

Mr. Kearney was born in Washington, D. C., on October 24, 1869, and resided in and around the capital during the early years of his life. He attended Georgetown University in 1888, and while there he attracted the attention of Pennsylvania Railroad men, with the result that he was given a special apprenticeship in the Altoona, Pa., shops of that company in 1888. After serving his apprenticeship he was made assistant road foreman of engineers, Philadelphia Division, of the Pennsylvania, and later served consecutively until September 1, 1902, as engineer of motive power, Philadelphia, Wilmington, and Baltimore Division; assistant engineer of motive power, United Railroads of New Jersey, at Jersey City, N. J.; assistant engineer of motive power to the general superintendent of motive power, at Altoona, Pa.; master mechanic at West Philadelphia, Pa., and superintendent of motive power, of the Philadelphia, Wilmington and Baltimore Division of the Pennsylvania, at Philadelphia.

On September 1, 1902, he was made superintendent of motive power of the lines west of the Ohio River of the Baltimore and Ohio Railroad. On February 1, 1903, he was transferred to the Connellsville, Pittsburgh and New Castle Divisions of the Baltimore and Ohio, in the same capacity, holding this position until January, 1904, when he was transferred in the same capacity to the Pittsburgh Division of the same road. On April 1, 1905, Mr. Kearney became associated with the Norfolk and Western as assistant superintendent of motive power, and held this position until November 1, 1918, when he succeeded Col. W. H. Lewis, now deceased, as superintendent of motive power.

Mr. Kearney joined the A.S.M.E. in 1897, and became a full member in 1899. For a number of years he served on practically all of the important research and administrative committees of the Mechanical Division of the American Railway Association, and for some time was a member of the General Committee of Direction of this Division. While he was superintendent of motive power on the Baltimore and Ohio Railroad, Mr. Kearney served for three years, along with four other outstanding engineers, as a member of an advisory board on mechanical engineering work at the Carnegie Institute of Technology at Pittsburgh. Pa. After he became connected with the Norfolk and Western he continued his activities along this line and was instrumental in establishing a special apprentice training course in the motive power department of that railroad for the benefit of students from a number of institutions, including Virginia Polytechnic Institute, in recognition of which he was made an honorary member of the General Alumni Association of that institution, Washington & Lee University, Ohio State University, and a number of others.

James Fraser Kimbell

James Fraser Kimbell was born at Columbus, Ga., on October 3, 1899, and died in Los Angeles, Cal., on July 28, 1928. He received his early education in Pasadena, Cal., and in 1913 entered the Harvard Military School in Los Angeles, from which he was graduated in 1917. He then went to Cornell University from which he received his M.E. degree and a certificate in electrical engineering in 1921.

During his summer vacations Mr. Kimbell worked for the Baker Iron Works in Los Angeles, and upon graduation he became mechanical draftsman and designer in the mechanical department of that concern. In 1922 he was transferred to the elevator department, where he served as draftsman, designer, estimator, and sales engineer. In 1926 he became chief engineer of the Gallagher Company, Los Angeles, manufacturers of the Gallagher pontoon roofs for oil storage tanks.

Mr. Kimbell became a junior member of the A.S.M.E. in 1925. He also belonged to the American Institute of Electrical Engineers and the Joint Technical Societies of Los Angeles.

Leonard J. Kimmel

Leonard J. Kimmel, vice-president of the Electro-Kold Corporation of Spokane, Wash., and inventor of the refrigerating machine manufactured by that company, died on April 17, 1928, at his home after an illness of two weeks.

Mr. Kimmel was born at Ypsilanti, Mich., on January 13, 1880. He secured his early education there and later attended the Michigan State College of Agriculture and Applied Science. After some experience in the operation of steam engines of the stationary, traction, and pile-driving types he went into partnership with his uncle in the operation of the first electric light plant in Harrison, Idaho. From 1903 to 1906 he had charge of the moving and installation of the power plant of the Harrison Light & Box Co., with whom he and his uncle had consolidated. For the next two years he was general manager of the Newport Electric Light Company and of the Bonners Ferry Electric Light Company.

From 1909 to 1913 Mr. Kimmel was engaged in the installation and operation of the electrically equipped planing mill of the Fidelity Lumber Company, at Newport, Wash. During the next three years he operated an electric contracting shop at Sandpoint, Idaho. In 1916 he became an engineer in the experimental department of the Doble Detroit Motors Company, assisting in the development of a steam car. He then assisted in the development of an oil-burning furnace which was later incorporated in the No-Kol automatic burner. About this time Mr. Kimmel became interested in the possibilities of electric refrigeration. He returned to Spokane and devoted his time to the perfection of the idea. The Electro-Kold Corporation was formed with Mr. Kimmel as vice-president and factory superintendent, later chief engineer. When the invention had proved successful and production had been increased, he devoted himself to the research side of the business.

Mr. Kimmel became an associate member of the A.S.M.E. in 1926. He also belonged to the Engineers Institute of American, the Society of Electric Refrigeration Engineers, and Associated Engineers of Spokane. He was a Methodist and a member of the Masonic fraternity. He is survived by his widow, Etta E. Kimmel, two daughters, and a son.

James Edwin Kirby

James Edwin Kirby was born at Glendale, S. C., on February 13, 1890, and died at Bloomfield, N. J., on February 2, 1928. He was educated at the Wofford Fitting School, Spartanburg, S. C., and received his B.S. degree in mechanical engineering at Clemson A. & M. College, South Carolina, in 1911. After graduation he entered the employ of the Erie Railroad Company, at Meadville, Pa., as special apprentice where he gained a wide and valuable shop experience. In 1916 he joined the American LaFrance Fire Engine Company, Inc., Elmira, N. Y., as sales engineer, where he assisted in the design and sale of new devices. Later in the same year he transferred to the Toronto. Canada, factory in charge of production, employment and service. He remained there until 1918 when he entered the employ of O. J. Childs Company, Inc., Utica, N. Y., manufacturers of fire apparatus, in charge of production and design of bodies, pumps, and all equipment mounted on motor chassis. In 1921 he became assistant superintendent of the asphalt plant of the Franklin Contracting Company at Athenia, N. J., and in 1923 was appointed mechanical engineer of the company, in charge of asphalt plants at Great Notch, Athenia, and Rahway, N. J., the position he held at the time of his death.

He became an associate member of the A.S.M.E. in 1921 and a member in 1924. He was an Elk and belonged to the New Jersey Professional Engineers.

Strickland Landis Kneass

Strickland Landis Kneass, prominent civil and mechanical engineer and inventor, died on November 25, 1928, at Daylesford, near Berwyn, Pa., from heart disease complicated by a severe cold.

Mr. Kneass was born in Philadelphia, Pa., on January 7, 1861, the son of Strickland Kneass, railroad executive, and descended on his mother's side from George Bryan, president of the Pennsylvania Committee of Safety during the Revolution. He was graduated from Rugby Military Academy, Philadelphia, in 1876, and four years later from Rensselaer Polytechnic Institute as a civil engineer.

After serving a three-year apprenticeship with William Sellers & Co., Inc., Philadelphia, he began experimental work on injectors for locomotive boilers, and devised a number of valuable improvements in the Sellers injector. He was made manager of the injector department in 1895 and vice-president of the company in 1927.

Besides his practical inventions he established new laws in thermodynamics, relative to terminal velocities, shapes of discharging nozzles and the formulas involved in the discharge of elastic fluids. His work on the removal and replacement of tubes from gun jackets at the naval gun factory in Washington was regarded as of great value in ordnance design.

The John Scott medal of the Franklin Institute was awarded Mr. Kneass twice, the first time in 1900 and again in 1926 for his exhaust feedwater heater injector. The Chicago exposition of 1893 and the St. Louis exposition of 1904 conferred awards upon him for his engineering achievements.

Mr. Kneass was the author of "Practice and Theory of the Injector" and of numerous articles on thermodynamics, non-ferrous metals, and similar subjects for technical journals. He was a fellow of the Royal Society of Arts, a trustee of Rensselaer Polytechnic Institute, and a member of many societies and clubs, including the National Institute of Social Science, the American Railway Association, Franklin Institute, and the A.S.M.E., which he joined in 1890. He was a Republican and Presbyterian. Music was his chief interest other than his work, although the study of the history of pirates was one of his hobbies.

Mr. Kneass's wife, Mary S. Edwards, of Red Bank, N. J., whom he married in 1888, died in 1923. He is survived by three sons.

Charles A. Knight

Charles A. Knight, whose death occurred on June 6, 1928, had been connected since 1879 with the Babcock & Wilcox Co. Following his studies at St. Francis Institute, a government college in Cuba, and at Eastman's Commercial College, Poughkeepsie, N. Y., he served an apprenticeship at the New York Iron Works, of Cobanks & Threall, New York, spent a year in the locomotive shops of the Erie Railroad, in Jersey City, N. J., and took a two-year course in mathematics at the Cooper Institute, New York.

He then went to sea, serving three and one-half years and obtaining a government certificate of first engineer for vessels of one thousand tons. In 1876 he became connected with the Copper & Machinery Works, in Jersey City, N. J., where he remained in a mechanical and commercial capacity until he entered the employ of the Babcock & Wilcox Company.

In 1882 he was appointed manager of the company's European business. For some years he was stationed in Glasgow, Scotland, and later was appointed director and was located in London.

Mr. Knight became a member of the A.S.M.E. in 1884.

George William Knopf

George William Knopf, designing and structural engineer, was born at Columbus, Ohio, on April 16, 1864, the son of Philip and Rebecca (Keller) Knopf. He received a B.Sc. from Ohio State University in 1883, and entered the " Study " Division of the U. S. Weather Bureau, then called the U. S. Signal Service. In 1886 he became draftsman for Riter & Conley, Pittsburgh, with whom he remained until 1894.

For the next six years Mr. Knopf engaged in independent engineering practice as structural engineer in Pittsburgh, designing and building numerous structures for tin, steel, casting and glass plants, and also engaged in some bridge work. In 1900 he was engaged by the McClintic-Marshall Construction Co., Pottstown, Pa., as engineer in charge of designing and estimating. In 1905 he was appointed contracting engineer, the following year assistant manager, and finally acting manager.

Fom 1919 to 1921 Mr. Knopf was designing engineer for the Lehigh Structural Steel Co., Allentown, Pa., and from that time was in business for himself in the design, fabrication, and erection of structural steel in Allentown.

Mr. Knopf became a member of the A.S.M.E. in 1916. His death occurred on April 26, 1928. He is survived by his widow, Amber (Stacy) Knopf, whom he married in 1889, and by four children.

Ernst Krimmel

Ernst Krimmel, vice-president of Werner Nygren, Inc., New York, N. Y., died on March 26, 1928. He was born in New York in May, 1882, attended the Ethical Culture School, and received his B.S. from Cooper Union in 1903; in 1910 he was given the degree of M.E.

From 1901 to 1911 he was associated with Alfred R. Wolff, New York, and supervised the design and installation of heating and ventilating equipment and power houses for a number of buildings in New York and other cities. He was then appointed Canadian manager for Nygren, Tenney & Ohmes, Mr. Wolff's successors, and was located in Montreal until 1914. At that time he went to New York as assistant to Mr. Werner Nygren, and was made a member of the firm of Werner Nygren, Inc., in April, 1927.

Mr. Krimmel became a member of the A.S.M.E. in 1914.

Byron E. LaFollette

Byron E. LaFollette, vice-president and treasurer of the Tarpenning-LaFollette Company, pneumatic engineers and sheet metal contractors, Indianapolis, Ind., died on November 28, 1928.

Mr. LaFollette was born at Portland, Ind., on June 29, 1884. He attended the public schools in Indianapolis and was graduated from Purdue University in 1909 with a B.S. degree in mechanical engineering. His first position was with the American Blower Co., in Detroit, Mich., as sales engineer. His work included the design of special heating, ventilating, and drying systems. In 1913 he became chief engineer and sales manager of the Calrage Fan Company, Kalamazoo, Mich., and spent some time in experimental work and testing of special equipment.

His next connection was made in 1918 with the Shipyard Plant Division of the Emergency Fleet Corporation, Philadelphia, Pa., as mechanical engineer. He had charge of the eastern office work in connection with the plants of the corporation on the West Coast, and supervised a special appraisal and audit of extension work at the Todd shipyards at Tacoma, Wash. He served on a board that formed a link between the corporation and the War Industries Board during the World War, and later was appointed home office engineer for the shipyard plants on the West Coast, in which capacity he served until March, 1920. He then returned to Indianapolis, where with Chas. T. Tarpenning he formed the Tarpenning-LaFollette Co., which specialized in drying systems, systems utilizing waste heat, and those dealing with air control.

Mr. LaFollette became a member of the A.S.M.E. in 1927. He is survived by his widow, Hazel O. LaFollette, whom he married in 1910, and by one son.

Louis Lanyi

Louis Lanyi was born in New York, N. Y., on March 7, 1889. His death occurred at the family home at Lombard, Ill., on December 11, 1928.

Mr. Lanyi secured his early education in the elementary and high schools of New York and later attended the College of the City of New York, his technical education being obtained at Cooper Union. Upon completion of his schooling he became associated with the Walter Kidde Construction Company, New York, and was placed in charge of field work on industrial plants designed and built by the company. In 1912 he became assistant superintendent and mechanical engineer for The Biograph Moving Picture Company, New York, and the next year accepted a position as assistant engineer in the fan division of the Green Fuel Economizer Company, Beacon, N. Y. In 1915 he was made chief engineer of the department.

In 1919 Mr. Lanyi formed the Engineering Sales Service Company in New York, dealing with steam motors. The following year he became associated with the Power Specialty Company, as engineer in the development of economizers and fans. Shortly thereafter he was put in charge of the Detroit sales office of the company. At the time of his death he was resident engineer for the Foster Wheeler Corporation, with headquarters at Chicago, Ill.

Mr. Lanyi was a specialist in the design and operation of induced draft fans and was frequently called upon in a consulting capacity to advise regarding the application of fans to the utilization of waste heat.

His membership in the A.S.M.E. dated from 1917, when he became an associate member of the Society.

Gaetano Lanza

Gaetano Lanza, professor emeritus of theoretical and applied mechanics at the Massachusetts Institute of Technology, and since his retirement from that institution, consulting engineer to the Baldwin Locomotive Works, died on March 21, 1928, at his home in Philadelphia. For many years physically helpless, his mind had retained that keenness which helped bring mechanical engineering out of the field of empiricism in which he found it when he joined the Institute staff in 1871 into a more rational and scientific one.

His achievements in engineering education are briefly epitomized in an inscription on a tablet erected at the Institute in the entrance to the mechanical engineering department which reads:

> THIS TABLET IS DEDICATED TO
> PROFESSOR GAETANO LANZA
> HEAD OF THE DEPARTMENT OF MECHANICAL ENGINEERING
> 1883-1911
> UNDER WHOSE LEADERSHIP THE DEPARTMENT WAS DEVELOPED AND BY WHOSE FORESIGHT THE FIRST LABORATORY FOR TESTING FULL-SIZED STRUCTURAL SPECIMENS WAS ESTABLISHED.

Professor Lanza was born in Boston, September 26, 1848. He was the son of Cavaliere Gaetano Lanza, of Palermo, Sicily, and Mary Ann (Paddock) Lanza, of Pomfret, Vt. His early schooling was at Charlottesville, Va., whither his family moved in 1859. He attended the University of Virginia, where he distinguished himself in mathematics, and from which he was graduated in 1870 with the degree of bachelor of science in civil and mechanical engineering.

After teaching at his alma mater for a year following graduation, he became an instructor of mathematics at the Massachusetts Institute of Technology. In 1872 he was appointed assistant professor, and, in 1875, professor of theoretical and applied mechanics, taking charge of the department of mechanical engineering in 1883, a position which he held until he was made an emeritus professor in 1911. His wife, Jennie Dice Miller, of Charlottesville, Va., whom he married in 1891, died in 1923.

Professor Lanza was an enthusiastic investigator throughout his life. His tests of timbers, framing joints, tile arches, reinforced concrete, locomotive connecting rods, springs, and his investigation of the balancing of high-speed machinery have been of great value to the profession. His publications, amounting to about one hundred, include his "Applied Mechanics" and his "Dynamics of Machinery."

He was a fellow of the American Academy of Arts and Sciences and member of the following organizations: International Society for Testing Materials; Boston Society of Civil Engineers; American Mathematical Society; Society of Arts of the Massachusetts Institute of Technology; Appalachian Mountain Club; Society for the Promotion of Engineering Education; British Association for the Advancement of Science; Franklin Institute; American Railway Master Mechanics' Association; Circolo Mathematico di Palermo; Societá Italiana per il Progresso delle Scienze; Public Art League; the Mathematical and Physical Club (composed of Harvard and Technology professors); and the Colonnade Club of the University of Virginia. He became a member of the A.S.M.E. in 1882. In 1907 he was decorated by the king of Italy as Cavaliere dell 'Ordine dei Sante Maurizio e Lazzaro.

Edward F. Lauda

Edward F. Lauda was born in New York, N. Y., on June 23, 1900, and died on October 26, 1928. He was educated in the public schools of New York, Bryant High School, Long Island City, and the Mechanics Institute, New York. In 1920 he accepted a position as chief draftsman for the National Carbon Company at the laboratories in Long Island City. From 1924 to 1925 he was salesman for the Prudential Life Insurance Company. He next became mechanical draftsman for the Perfect Window Regulator Company, Long Island City. At the time of his death he was connected with the Laminated Shim Company, Long Island City.

Mr. Lauda became a junior member of the A.S.M.E. in 1926.

Frank McDowell Leavitt

Frank McDowell Leavitt, engineer and inventor, and chief engineer of the E. W. Bliss Company, Brooklyn, N. Y., died on August 6, 1928, at his home in Scarsdale, N. Y. He had been in ill health for some time.

Mr. Leavitt was born at Athens, Ohio, on March 3, 1856, the son of the Rev. John McDowell Leavitt and Bithia Brooks Leavitt. His father was later president of Lehigh University and then of St. John's College, Annapolis, Md.

Mr. Leavitt secured his early education in New York, where the family moved when he was twelve years old, and later in Orange, N. J. He was trained in engineering at Stevens Institute, from which he was graduated in 1875. He received his M.E. from that institution in 1905 and the degree of Doctor of Engineering on the Fiftieth Anniversary of the Institute in June, 1921.

Soon after graduation he entered the employ of Frederick E. Sickles in New York City, and there developed plans for the first steam steering gear used by the United States Navy.

In August, 1876, Mr. Leavitt became head draftsman for Bliss & Williams of Brooklyn, N. Y., and was employed there until early in 1881. He then decided to try other branches of engineering and for nearly a year was master mechanic of the Texas Division of the Mexican National Railroad, with headquarters at Corpus Christi. Late in 1881 he returned to New York and became superintendent of the Graydon and Denton Manufacturing Company of Jersey City, N. J., manufacturers of rock drills and mining machinery. During the two years which he spent with this company he patented a number of important improvements in the tools which it manufactured.

In 1883 Mr. Leavitt withdrew from the mining machinery field and returned to E. W. Bliss Company, successor to Bliss and Williams, as assistant superintendent, and in 1884 was appointed superintendent of that company. From this time on until about 1900 he was actively engaged in designing and manufacturing a most varied line of sheet metal working machinery.

The records of the patent office began to show his name as an inventor within a year or two of his graduation from Steven's, and from that time on until 1921 or 1922 a constant stream of patents aggregating some three hundred testify to his mechanical skill and inventive genius.

Among his inventions of wide importance to the industrial world was an automatic can making machine, which revolutionized that business. Later he produced the first toggle draw press, which is used for producing all kinds of hollow pressed ware, such as kitchen utensils. His inventions in pressing and stamping machinery were the first step in the development of the huge power presses which now are used in the sheet metal industry in manufacturing automobile bodies and frames.

In the late eighties, when the U. S. Navy Department was making efforts to introduce into the United States the manufacture of up-to-date ordnance, Mr. Leavitt made an extensive tour abroad, during which he visited the British, Austrian, and German torpedo and projectile manufacturing plants, as representative of the E. W. Bliss Company. He purchased American rights to the Whitehead torpedo and returned to this country where he developed the machinery necessary for manufacturing the torpedo. At about this time he also designed and installed the plant of the U. S. Projectile Company, for manufacturing small and medium caliber " common " projectiles.

From 1890 Mr. Leavitt was engaged in the improvement of the Whitehead torpedo and in developing a new torpedo. In order to devote himself entirely to this work he left the E. W. Bliss Company shortly after 1900 and established his own office and drafting room in New York. When the new torpedo had finally been patented and purchased by the Bliss Company he returned to that organization as an officer and director. This torpedo, known as the Bliss-Leavitt torpedo, has been used by the U. S. Navy since about 1910.

During the World War Mr. Leavitt served as chairman of the Committee on Experimental Power, assigned by the Bureau of Steam Engineering to develop a steam plant for the propulsion of aircraft, and devoted nearly all his time to the work as a " dollar-a-year " man. The committee, somewhat reduced in size, functioned for nearly two years after the close of the war, and completed plans and test records for an aircraft boiler capable of delivering about 1000 horsepower with a total weight of about 2000 pounds. This was practically the last engineering work which Mr. Leavitt undertook.

His knowledge of mechanical motion and force enabled Mr. Leavitt to picture the most difficult mechanism in the simplest of forms, to design its parts in detail, and to direct its construction in the shop, often without even assembling the parts on drawings. His principal diversons were painting in oils and reading.

He was a member of the American Society of Civil Engineers, Society of Naval Architects and Marine Engineers, the American Association for the Advancement of Science, and a number of clubs. He became a member of the A.S.M.E. in 1887.

He is survived by his widow, Gertrude M. (Goodsell) Leavitt, whom he married in 1893, and by one daughter.

Sanford Daniels Leland

Sanford Daniels Leland, manufacturer and inventor, died at his home in Wellesley Hills, Mass., on July 29, 1928.

He was born at Sherborn, Mass., on August 23, 1862. Following his graduation from the Sawin Academy of that town in June, 1879, he entered the Worcester Polytechnic Institute, from which he was graduated in 1883 with the degree of B.S. in mechanical engineering. He immediately joined the Deane Steam Pump Company of Holyoke, Mass., as inspector, later being advanced to assistant superintendent.

In 1894 he became superintendent of the Winchester, Mass., factory of the McKay Metallic Fastening Association, later consolidated with the United Shoe Machinery Company. He made several inventions in shoe machinery while connected with this company. He was also a member of the building committee of the Beverly plant of the company, taking an active part in its design and construction. While located in Winchester he took an interest in town affairs, serving as Selectman in 1903, as a member of the Water Board from 1907 to 1912, and on various other town committees.

In 1906 Mr. Leland became president and general manager of the manufacturing Equipment & Engineering Co., of Boston, the first factory in the United States to manufacture a complete line of welfare equipment for industrial plants. His inventions in this line were responsible for more hygienic working conditions, in no small measure causing improved relations between employees and employers. Mr. Leland's pioneering in this field helped to bring about a new era in industrial sanitation.

In 1910 this company moved from its Winchester factory to a larger one at Framingham, Mass., Mr. Leland still continuing as president and general manager and holding these positions up to the time of his death.

He became a resident of Wellesley Hills in 1910. He was a member there for many years of the Maugus Club and the Wellesley Country Club. He was also a member for many years of the Engineers Club and the University Club of Boston, the Rotary Club of Framingham, and the William Parkman Lodge of Masons, of Winchester. He became a member of the A.S.M.E. in 1900.

William E. Lester

William E. Lester was born in Magdeburg, Germany, on January 19, 1886, and received his early education there. From 1910 to 1915 he studied engineering at Cooper Union, New York, being graduated in 1915 with the degree of B.S. in mechanical engineering, and receiving his M.E. degree in 1919.

From 1900 to 1904 Mr. Lester served an apprenticeship in the machine shop and drafting room of the Krupp-Gruson Works in Magdeburg, and during this time attended evening classes at Koenigliche Maschinenbau Schule. After a short time in 1904 in the Krupp-Germania shipyard at Kiel as machinist, he became assistant operating engineer for the Flensburg Steamship Company, Flensburg, Germany, making a trip from England to South America.

He then entered the employ of the Hamburg-American Line and in 1906 came to America.

For a few years Mr. Lester worked as machinist for the Rex Mfg. Co., Jersey City, N. J., and Schinasi Bros., New York, being connected with the latter firm from 1907 to 1915 as machinist and master mechanic. During this time he took evening courses first in high school and then at Cooper Union.

Upon his graduation from Cooper Union in 1915 Mr. Lester accepted a position in the projectile department of E. W. Bliss Co., Brooklyn, as designer of special machinery for shell manufacture, and later in the same year was made chief engineer for the General Ordnance Company. In September, 1916, he became general superintendent for the Vulcan Iron Works, Denver, Colo., a unit of the General Ordnance Company, continuing to serve the latter concern as consulting engineer until it was dissolved in 1921. In 1923 he was made chief engineer of the Vulcan works, a position which he held until his death.

Mr. Lester became a member of the A.S.M.E. in 1918. He was secretary of the Colorado Section for six years, and chairman for two years. He was also a member of the Masonic fraternity. His death, due to ulcers of the stomach, came at Denver on June 17, 1928, after several months' illness.

J. Oswald Lombard

J. Oswald Lombard, sugar-house engineer and contractor, Havana. Cuba, died on January 5, 1928, at Rochester, Minn. Mr. Lombard was born on August 21. 1885, at Cienfuegos, Cuba. He attended Cornell University, being graduated in 1907 with the degree of M.E., and then entered Columbia University for post-graduate work, receiving his degree of C.E. there in 1909.

For the next two years he was connected first with the Cienfuegos, Calmira & Cruces Railway & Power Co. and then with the Havana Electric Railway & Power Co. From 1911 to 1913 Mr. Lombard was connected with Lebedjeff & Co., New York, in charge of designing and erecting the sugar mills of the Utuado Sugar Co., La Plata Sugar Co., and the Camui Sugar Co., all in Porto Rico.

As senior partner of the firm of Lombard & Co., Havana, Cuba, designers and builders of sugar machinery, he was engaged for the next five years in designing and erecting about 150 small electric plants, besides specializing in the construction of evaporating machinery in the sugar house. He designed the Lombard vacuum pan, used in a number of Cuban plants, and two complete sugar mills were built under his personal direction: the Central Najasa in 1920, and Central Siboney in 1925, with an approximate capacity each of 150,000 bags. It was while erecting the latter mill that Mr. Lombard felt the first symptoms of ill health, but he nevertheless delivered the mill in perfect running order in record time, less than ten months.

Mr. Lombard became a member of the A.S.M.E. in 1919. He is survived by his widow and one son.

John E. Lonergan

John E. Lonergan, who died of bronchial pneumonia on October 23, 1928, was born in Nicholastown, Ireland, on May 25, 1841, and was educated in the schools there and in the United States, where he came at an early age. He learned the machinist trade, and worked as a journeyman in the machine shop of the Boston & Albany R.R., under Wilson Eddy, master mechanic. He secured some experience also in the manufacture of paper making machinery, and for five years was employed as machinist runner by the Central Pacific Railroad of California.

In 1875 he settled in Philadelphia to engage in the manufacture of patent safety steam appliances. He was president of the John E. Lonergan Company, founders and machinists, and the H. Brinton Company, manufacturers of knitting machinery, Philadelphia, and of the California Vineyards Company. He had patented several engineering devices which are used by the Southern Pacific Railroad and which he manufactured. In 1922 he was one of the leading figures in the Forty-Niners' celebration in Sacramento, Cal.

Mr. Lonérgan was very active in the Catholic Church and other Catholic organizations. He was a trustee of the Beneficial Saving Fund Society of Philadelphia and of St. Charles Borromeo Seminary, Overbrook, a member of the American Catholic Historical Society, and several societies in Bala, the suburb of Philadelphia in which he made his home. He was honored by the Pope and made a privy chamberlain of the sword and mantle in 1922. At the time of the removal of St. Joseph's College to the City Line he donated $100,000 toward the establishment of an engineering school which bears his name, and he also gave a large sum for the building of St. Matthias' Church at Bala.

Mr. Lonergan became a member of the A.S.M.E. in 1921. He is survived by his widow, Elizabeth McCall Lonergan.

William Albert Lorenz

William Albert Lorenz died at his home at West Hartford, Conn., on January 27, 1928, from the effects of an automobile accident. Mr. Lorenz was born in Brooklyn, N. Y., on September 27, 1847. He attended the Brooklyn Polytechnic Institute and in 1866 started work as machinist apprentice with the Bridesburg Manufacturing Company, Philadelphia, Pa., manufacturers of cotton and woolen machinery.

In 1871 he left Philadelphia to go to Newark, N. J., where he worked on experimental machinery for the American Telegraph Company. In 1873 he entered the employ of S. W. Greene, New York, N. Y., to work on a typesetting machine. Mr. Lorenz developed one of the earlier automatic typesetting and justifying machines, known as the Empire machine, which was constructed by the Pratt & Whitney Company of Hartford, Conn. This led to his going to Hartford in 1881 as head of the drafting department of that company where he had charge of the designing of numerous machines built by them. In 1883 he became associated with Lenibach & Wolle to perfect their square paper bag machine.

In 1887 Mr. Lorenz opened his own office in Hartford, where he continued the inventing and developing of numerous automatic machines and industrial systems, including the manufacture of paper bags and specialties, typesetting and justifying machines, typewriting machines, pianos, and hat-making machines. One of his important undertakings was the development of machinery and methods of preparing, preserving and packaging food products for the Beech-Nut Packing Company. He had more recently been engaged in the development of methods and machinery for the manufacture of glassware. In this connection he was the prime mover in the organization of the Hartford-Empire Company, now one of the important industrial concerns of Hartford. His license to practice at Solicitor of Patents was one of the first granted by the Patent Office.

Mr. Lorenz was a member of the Stamp Collectors' Club of Hartford. He specialized in air-mail stamps, of which he made a fine collection.

At the close of the World War Mr. Lorenz conceived the idea of a collection of autographs and photographs of presidents, military leaders, war heroes and heroines, and other outstanding figures connected with the war, to be used as a means of raising money to aid war sufferers of the various allied nations. A large collection was made, each request being accompanied by a lithograph of a Victory-Harmony banner composed of the forty-eight flags of the allied countries, the original of which was presented to Marshal Foch.

He became a member of the A.S.M.E. in 1899.

Albert C. Ludlum

Albert C. Ludlum, whose death occurred on February 15, 1928, was born in Brooklyn, N. Y., on May 13, 1867, the son of William H. and Mary A. (Kellem) Ludlum, and was educated in the public schools there.

In 1883 he entered the National Shoe & Leather Bank, New York, where he remained for two years. The next two years were spent with the Vulcan

Iron Works, Denver, Colo., manufacturing mining machinery. He then became designing engineer and general manager for the Kennedy-Pierce Machinery Co., in Denver, designing mining machinery, especially hoisting engines. From 1891 to 1893 he engaged in designing electrical apparatus for the Electric Power Transmission Co., also of Denver, and during the next two years was engineer and salesman for the Denver Engineering Company.

From 1895 to 1906 Mr. Ludlum was associated with James Beggs & Co., New York, in the capacity of engineer and salesman. In 1906 he organized the New York Engineering Company, of which he was president and owner, to design and build placer mining machinery in all parts of the world, especially gold dredges. In 1914 he organized the National Bush Company, New York, to manufacture a patent bushing for barrels, and the following year organized the Derry Ranch Gold Dredging Company, Leadville, Colo. He served as president of both these concerns. He also organized the Guatemala Gold Dredging Company, Guatemala, C. A., and the Ludlum Engineering Company, New York, and served as their president.

Mr. Ludlum received numerous patents covering gold dredging machinery, placer prospecting machinery, marine boilers, etc. He was a member of the A.S.M.E., which he joined in 1918, and also of the American Institute of Mining and Metallurgical Engineers, the Mining and Metallurgical Society of New York, the Society of Naval Architects and Marine Engineers, the Academy of Political Science, and a number of clubs.

Mr. Ludlum is survived by his widow, Francis A. (Nessel) Ludlum, whom he married in 1915.

Alexander MacWatt

Alexander MacWatt, whose death occurred on December 26, 1928, in Panama, was born on April 3, 1880, in Glasgow, Scotland. He served an apprenticeship with D. & W. Henderson Co., of the Glasgow Anchor Lines, after which he went to sea for seven years, with the Red Star Line and American Line. He received the British Board of Trade certificate of first class engineer and an American license as marine engineer. He became a Junior Second Assistant on the American Line.

From 1909 to 1918 Mr. MacWatt was connected with the Travelers Insurance Company, spending part of this time in Atlanta, Ga., as field engineer, supervising the erection of mills, factories, and buildings, and the installation and inspection of machinery. From that time until his death he was ship and engineer surveyor for the Lloyd's Register of Shipping, first in charge of the construction and repair of ships and their machinery in the Port of New York, and later in the Panama Canal Zone.

Mr. MacWatt became a member of the A.S.M.E. in 1923. He also belonged to the Society of Naval Architects and Marine Engineers and the Masonic fraternity.

Fred Maier

Fred Maier, of Los Angeles, Cal., died on September 5, 1928. He was born in Cleveland, Ohio, on September 30, 1881. He served an apprenticeship with the Baker Iron Works as patternmaker from 1896 to 1901 and during the next two years worked as draftsman and patternmaker with the Rider Iron Works, San Francisco; Davis Iron Works, Denver; Crane Company and Western Electric Company, Chicago; and Ottis Steel and U. S. Tiler Co., Cleveland. He then returned to the Baker Works as head of the pattern shop. He left their employ in 1904 to design and build an Easter egg machine.

In 1904 Mr. Maier became associated with the Astoria Iron Works, Astoria, Ore., as draftsman and patternmaker, designing canning machinery and marine engines. After a year there he was appointed superintendent of the Washington Iron Works, Los Angeles, with whom he remained for three years, designing and building fruit washing and grading machines, roadmaking machinery, pipe-bending machines, ore grinders, fertilizer dryers and pulverizers, etc. He next spent a year in study and research in Cleveland, and then accepted a position as mechanical estimator and designer with the Philips Iron Works, Los Angeles.

In 1911 he established the Mechanical Pattern Works in Los Angeles, and conducted this business until his death.

Mr. Maier became an associate member of the A.S.M.E. in 1916. He is survived by his widow, Lucia E. Maier.

A. George Mattsson

A. George Mattsson, whose death occurred on September 1, 1928, was born in Sweden on September 16, 1855. After completing his early schooling he entered the machine shop of the Motala Works, Gothenburg, as apprentice. Subsequently he attended the Chalmers Institute in the same city, and was graduated in 1877. For three years he was a draftsman, first at the Kockums Mechanical Works, Malmo, and later at the Motala Works.

In 1880 Mr. Mattsson came to the United States, and after being engaged as a draftsman for about two years in various companies, he accepted the position of chief draftsman at the Cummer Engine Works, Cleveland, Ohio, manufacturers of stationary engines, in November, 1882. He took a similar position with Hodge and Company, Detroit, Mich., in April, 1884, devoting the most of his time to designing marine engines, and contributing largely to the various types of compound and triple expansion engines.

The following year Mr. Mattsson became mechanical engineer with the Detroit Shipbuilding Company, and in collaboration with his life-long friend, Frank E. Kirby, designed the machinery in a number of ships, attaining the highest fuel economy of that period. The quadruple expansion engine was introduced in 1898 and installed chiefly in the package freighter class of ships. He resigned in 1903 and for a short time was chief engineer with the Canadian Shipbuilding Company of Toronto. During this time he designed several engines. notably for the observation steamer *Cayuga,* which was equipped with twin screw quadruple engines and attained the highest speed of any of the Great Lakes vessels of that time.

In the spring of 1905 Mr. Mattsson returned to Detroit as chief engineer for the Great Lakes Engineering Works, and was consulting engineer with the same concern from 1913 until his resignation in 1922. Since that time he had devoted himself to various private enterprises.

Throughout his career as a designer Mr. Mattsson always had in view simplicity combined with reduction of space and weight as well as high fuel economy. His triple expansion lake engine, accepted as standard design today, with some slight modifications from the original design, illustrates the features which he strove to attain.

Mr. Mattsson became a member of the A.S.M.E. in 1892.

James McNaughton

James McNaughton was born on August 6, 1859, in Queensville, Ontario, Canada, the son of Archibald and Mary McNaughton. At the age of fourteen he went to Woodbridge, Ontario, where he served a five-year apprenticeship with the John Abell Eng. & Machine Works. He then went to Muskegon, Mich., where he lived for a time, removing in 1881 to Brainerd, Minn., as foreman in charge of shops on the Northern Pacific Railroad. After two years he was transferred to Livingston, Mont., as division superintendent of rolling stock. In 1890 he became superintendent of motive power on the Wisconsin Central Railroad, and was located at Waukesha, Wis.

In July, 1899, Mr. McNaughton accepted a position as superintendent of the Brooks Locomotive Works, and went to Dunkirk, N. Y. Upon the formation of the American Locomotive Company in 1902 he became general manager of the Brooks and Schenectady plants. Two years later he was transferred to Schenectady as general manager of the American Locomotive Company. In 1908 he became vice-president in charge of sales for the company, and moved to New York, and two years later he was given charge of manufacturing, also.

Mr. McNaughton resigned his position with the American Locomotive Company in 1915, accepting an appointment as president of the Eddystone Munitions Company, at Eddystone, Pa., where he remained for five years. He next was made vice-president of the Baldwin Locomotive Works, in charge of the New York office, the position he held at the time of his death, on July 27, 1928.

Mr. McNaughton became a member of the A.S.M.E. in 1903, and was a member also of the Canadian Society of New York and a number of clubs.

Thomas Harrison Miller

Thomas Harrison Miller, assistant to the manager of the technical department, Solvay Process Co., Syracuse, N. Y., died on January 19, 1928. Mr. Miller was born on February 7, 1874, at Bruin, Pa. He was graduated from Pennsylvania State College in 1901 with the degree of B.S., and was then for several years engaged in steam-engine work, first with concerns in the oil fields of Pennsylvania and then with the Newport News Shipbuilding & Dry Dock Co. From 1901 to 1905 Mr. Miller was employed as draftsman on power-plant, rolling-mill and blast-furnace work with the Carnegie Steel Co., in the office of the chief engineer. He resigned to become associated with the Semet-Solvay Co., Syracuse, N. Y., as draftsman, later becoming chief draftsman and then engineer of design.

Mr. Miller became a junior member of the A.S.M.E. in 1905 and a member in 1922, and belonged to several clubs.

Allen H. Moore

Allen H. Moore, former chairman of the Standardization and Mechanical Design Committees of the General Electric Company, and an assistant to Vice-President E. W. Allen, died at his home in Albany, N. Y., on January 3, 1928. He had retired from the company on August 1, 1927, because of impaired health, and recently suffered a stroke.

Mr. Moore was born on February 4, 1865, in Vermont. He was graduated from Rose Polytechnic Institute as a mechanical engineer in 1888. From August of that year until 1892 he was with the Thomson-Houston Electric Company and the Thomson-Houston International Electric Company as an engineer. In 1892 he was sent to Berlin and attached to the manufacturing department of the newly organized Union Elektricitats Gesellschaft, a selling organization, the manufacturing for which was done by Ludwig Loewe & Co. Mr. Moore started the work of manufacturing electrical apparatus there, and remained in Germany until 1899. He was then sent to England to plan and superintend the erection of the Rugby plant of the British Thomson-Houston Company. In 1901 he returned to the United States to become associated with E. W. Rice, Jr., then third vice-president of the General Electric Company.

Three years later he was appointed to the Engineering General Department and became chairman of the Standardizing Committee and chairman of the Committee on Mechanical Design, acting as an assistant to F. C. Pratt.

One of Mr. Moore's greatest contributions to the progress of the company was the coördinating of engineering work among the various plants and the standardization of materials, carried out through the Committee on Mechanical Design.

Mr. Moore became a member of the A.S.M.E. in 1902. He is survived by his widow, Mabel Allen Moore, and by four children.

Edward O. Mueller

Edward O. Mueller, whose sudden death from acute indigestion occurred on December 20, 1928, was a native of Carlsbad, Czechoslovakia, where he was born on July 30, 1881. He attended the public schools and then the Technical University of Vienna, from which he received a mechanical engineering degree in 1905.

Mr. Mueller then came to the United States and until 1915 was employed by steel plants in the Pittsburgh, Pa., district as draftsman, designer, and checker. The plants with which he was associated were the Lorain Steel Co., Johnstown, Pa., 1907-1909; Carnegie Steel Co., Sharon, Pa., 1909-1910; Republic Iron & Steel Co., Youngstown, Ohio, 1910-1911; National Tube Co., Ellwood City, Pa., 1912-1914; and Pittsburgh Crucible Steel Co., Midland, Pa., 1914-1915.

The next five years Mr. Mueller spent with The Koppers Company. He designed the first successful hurdle washer for the removal of light oil from coke oven gas, built by The Koppers Company. His work also involved the design of benzol and toluol plants, calculations for new plants, and purchasing of apparatus. He carried on research work in conjunction with the Mellon Laboratory of the company for the standardization of plant design.

For a short time he was assistant engineer for the H. L. Doxon Company, in Pittsburgh, glass-plant builders. He then was appointed engineer in charge of the Gas Producer Department of the Geo. J. Hagan Company, combustion furnace engineers, Pittsburgh, Pa. During the latter part of 1921 he managed the Pittsburgh office of the Pittsburgh Wire Rope Company.

The next six months were spent in consulting work. In 1922 he became secretary and a member of the firm of Buell, Scheib, Mueller, Inc., consulting engineers, Pittsburgh, dealing principally with combustion work and furnaces. From 1923 to 1924 he was sales engineer for the Sterling Equipment & Supply Co. of Pittsburgh and Philadelphia, and was the first agent for the Centrifix Corporation of Cleveland, for which he was salesman and testing and development engineer from 1924 to 1926, handling the "centrifix," a centrifugal apparatus for the separation of water from steam, air, etc. During the next two years he represented the Tate-Jones Co., Inc., furnace engineers, Leetsdale, Pa., and Costello Engineering Company, manufacturers of industrial furnaces and furnace equipment, Pittsburgh, as manager of district offices in Ohio, Michigan, Indiana, and Northwestern Pennsylvania, and as a salesman.

Mr. Mueller became a member of the A.S.M.E. in 1922. He also belonged to the American Society of Steel Treating, the Engineers Society of Western Pennsylvania, and the Cleveland Engineering Society.

Mr. Mueller is survived by his widow and two children.

James William Nelson

James William Nelson was born on September 4, 1867, at Cambridge, Ohio, and died at Altadena, Cal., on February 16, 1928. Most of his early education was received at Lawrence, Kansas, and he spent one year at the Western Pennsylvania Classical and Scientific Institute. In 1891 he became associated with Richard Dudgeon and the estate of Richard Dudgeon, New York, N. Y., as mechanical correspondent, estimator, cost-keeper and assistant to the manager. In 1897 he was placed in charge of the repair and tube expander departments, including the direction of work and the design of special tube expanders. In 1902 he was made mechanical engineer and superintendent of the factory with entire and responsible charge of all manufacturing and designing. In 1904 he was appointed manager, general superintendent, and engineer, and later was made vice-president of Richard Dudgeon, Incorporated. He resigned in 1925 because of ill health and moved to California.

Mr. Nelson obtained a number of patents in the United States upon high pressure hydrostatic appliances and also obtained English and German patents on the same class of work. He designed an entirely new line of hydraulic jacks and pressure pumps.

Mr. Nelson belonged to the Presbyterian Church and the Sons of the Revolution. He was a past-president of the Brooklyn Engineers' Club and a former member of the American Society of Civil Engineers from which he resigned when his health failed. He was elected an associate of the A.S.M.E. in 1904 and received full membership in 1913.

Toivo Edward Nissinen

Toivo Edward Nissinen, who died on July 19, 1928, was born at Lynchburg, Va., on July 29, 1905. He attended the elementary schools in Lynchburg, the Woodrow Wilson High School in Portsmouth, and the Virginia Polytechnic Institute, Blacksburg, Va., from which he was graduated in 1926, with a B.S. degree.

In August, 1926, Mr. Nissinen took a position as inspector in the automatic production department of the American Can Company in Brooklyn, N. Y. He remained there until March of the following year, when he became connected with the Interborough Rapid Transit Company, New York, where he worked as assistant engineer in the economic division of the motor power department, until the time of his death.

Mr. Nissinen became a junior member of the A.S.M.E. in 1927. He was a second lieutenant in the Reserve Officers Corps of the 51st Division, Coast Artillery, Fort Eustis, Va.

Robert Van Arsdale Norris

Robert Van Arsdale Norris, who died at his home in Wilkes-Barre, Pa., on April 20, 1928, was born at Newark, N. J., on May 2, 1864. He attended the Collegiate School in New York and then the Columbia School of Mines where he was graduated in 1895 with an E.M. degree. In 1914 the University gave him an honorary M.Sc. degree,

Upon his graduation he was chosen as assistant to Professor Munroe in the summer school of mining and surveying and shortly afterwards became inspector of dredging operations on the Maurice River inprovement work, Millville, N. J. The following year he worked in the chemical laboratory of Herman Behr in Brooklyn and toward the end of 1886 he joined the staff of the Pennsylvania Railroad Coal Co., and the Susquehanna Coal Co., as assistant engineer. Six years later he was made principal assistant engineer and in 1900 chief engineer of these companies. In 1904 Mr. Norris withdrew from these concerns and established an office as consulting engineer at Wilkes-Barre, later taking his son, Robert V., Jr., into partnership with him. They specialized in the examination and appraisal of coal properties.

At various times Mr. Norris served as non-resident lecturer on coal mining both at Columbia and Harvard. Perhaps his most notable piece of public work was as engineer to the United States Fuel Administration and as a member of the price-fixing committee of the War Industries Board.

Mr. Norris became a junior member of the A.S.M.E. in 1885 and six years later a member. He had served as councillor, vice-president, and director of the American Institute of Mining and Metallurgical Engineers, in which organization he was very active, and also belonged to the American Society of Civil Engineers, the Canadian Institute of Mining and Metallurgy, and the Institution of Mining Engineers of Great Britain. He was much interested in the affairs of Columbia University and the Chamber of Commerce at Wilkes-Barre, and belonged to a large number of clubs.

Frederic Huntington Parke

Frederic Huntington Parke, general engineer of the Westinghouse Air Brake Company, Pittsburgh, Pa., since 1921, died at his home in Edgewood, Pa., on June 16, 1928.

Mr. Parke was born on April 6, 1869, at Waterloo, N. Y. His parents subsequently moved to Binghamton, N. Y., where he received his grade school education, supplemented by a course at St. John's School, Manlius, N. Y. His engineering training was acquired at Cornell University, from which he was graduated in 1892.

In the fall of that year he entered the service of the old Westinghouse Machine Company as draftsman, and advanced to the position of engineer of tests. In August, 1898, he was selected as technical adviser to assist in the establishment of the Russian Westinghouse Company at St. Petersburg, and appointed assistant to the manager of the new plant there. He returned to the United States in 1903, and was given charge of the preparation of practical books for the air brake student and of miscellaneous publications for the air brake trade, issued by the Westinghouse company. In February, 1909, he was made industrial engineer and did much toward finding new fields for Westinghouse air compressors. Later in the same year he was appointed resident engineer of the Southeastern District as then constituted. On December 1, 1920, he was made engineer of the export department, and about a year later became general engineer, the position he held at the time of his death.

Mr. Parke became a member of the A.S.M.E. in 1916. He was instrumental in organizing the Pittsburgh Air Brake Club and served as its secretary. Among his contributions to air brake literature was a paper on Braking Power for Freight Trains, presented to the Air Brake Association a few months before his death. Mr. Parke is survived by his widow and two children.

Richard H. Pascall

Richard H. Pascall was born at Fenton, Staffordshire, England, on October 6, 1841, the son of Richard and Margaret Pickering Pascall. He came to the United States when he was seven years old and was educated in the public schools of New York, N. Y. He graduated from the Free Academy, now the College of the City of New York, and entered Cooper Institute to take a course in mechanics. His studies in that institution were interrupted because of his enlistment in Company A, 71st New York Volunteer Infantry, for service in the Civil War. Upon completion of his first enlistment in 1863 he reenlisted as sergeant of Company K, 37th New York Voluntary Infantry, and was with that regiment when it was called home to suppress the draft riots in New York City. Following the war he entered the New York State Militia in which he attained the rank of captain before he moved to Connecticut.

After serving an apprenticeship with Thomas R. Pickering he obtained shop experience with the firm of Pickering & Davis until 1870. He continued his association with the Pickering organization as journeyman, and foreman and in 1888 was made superintendent of the Pickering Governor Company, Portland, Conn. Since 1902 he had been president of the company.

Mr. Pascall was a member of the Masonic fraternity, Odd Fellows, and G. A. R., and an Episcopalian. He was very active in civic affairs in Portland, which he represented in the legislature in 1905. For many years he served as vice-president and director of the First National Bank, until it was merged with the Freestone Savings Bank to form the Portland Trust Company, of whose board of directors he was chairman. He had been chairman of the Second School District and director of the library, helped to organize the Portland Volunteer Fire Department, serving as fire chief for a long period, and had taken part in various other activities of the town. He became a member of the A.S.M.E. in 1894, and was much interested in mechanical developments.

Mr. Pascall is survived by a son and two daughters. His wife, Mary A. (Lasher) Pascall, died in 1914.

Robert H. Pearson

Robert H. Pearson, consulting engineer, Globe Indemnity Co., Newark, N. J., died suddenly at his home in North Plainfield, N. J., on March 19, 1928. Mr. Pearson was born in Glasgow, Scotland, on December 25, 1864. He attended Glasgow University and then served a seven-year apprenticeship in engineering in the works of John Elder & Co., Glasgow, Scotland. He then went to sea in the British Mercantile Marine, passing all necessary Board of Trade examinations within three years. He continued at sea for eight years as chief engineer.

He then came to the United States and entered the employ of the Red Fort Iron Works, New York, as superintendent. Three years later Mr. Pearson went to the West Indies and South America to take charge of several plantation installations together with some railroading and bridge building. After three years there he returned to New York to become associated as mechanical superintendent with the late Mr. Morse, who was then general manager of the Harlan & Hollingsworth Co., Wilmington, Del. When Mr. Morse became president of the New York Shipbuilding Co., Camden, N. J., Mr. Pearson also became connected with that firm in charge of plant installation. He laid down the first engine the firm built.

Later he bacame chief engineer for a commission appointed by the Mexican government to supervise the construction of the cruisers *Vera Cruz* and *Tampico*, built by Lewis Nixon at Elizabeth, N. J. He remained in this service until the vessels were completed. In 1905 he became associated with the Travelers Insurance Co., where for six years he was connected with their engineering and inspection department on special rating work.

In 1911 he joined the staff of the Globe Indemnity Co., as superintendent of the inspection department and served in various branches of this department over a period of 16 years. He was the inventor of a number of safeguards and was actively interested in accident-prevention work.

Mr. Pearson became a member of the A.S.M.E. in 1915. He also belonged to the Casualty Council of the Underwriters' Laboratories and the Masonic fraternity. Mr. Pearson is survived by his widow, Agnes S. Pearson.

William Pestell

William Pestell, vice-president and sales manager of the Riley Stoker Corporation. Worcester, Mass., died on July 10, 1928, from a cerebral hemorrhage while making a business trip to New Orleans.

Mr. Pestell was born in Rutland, England, in January, 1873. He came to the United States, and at the age of fourteen entered the employ of the Sprague Electric Railway & Motor Co., Boston, Mass. After acquiring experience in machine shop work and general work on the installation and repair of electric motors, he became assistant electrical engineer for the Naumbaug Street Railway Co., Salem, Mass., and Lynn & Boston Railway, Lynn, Mass. In 1900 he accepted a position as superintendent of motive power and machinery with the Worcester Consolidated Street Railway Company. Worcester, Mass.

From 1903 to 1905 Mr. Pestell was in New York as assistant mechanical engineer for J. G. White & Co., and engaged in preliminary engineering in connection with the Hudson River tunnels for the Hudson & Manhattan Railway Company. He returned to Worcester in 1905 as president and general manager of the Worcester Steel Foundry Company. In 1907 he went to Boston to become sales engineer in charge of the sales of steam turbines. pumping engines, and power apparatus for the Allis-Chalmers Co. From 1910 to 1914 he was superintendent of power and lines of the Rhode Island Company, Providence, R. I.

During the next five years, Mr. Pestell was connected with B. F. Sturtevant Co., in Chicago, as combustion engineer in charge of underfeed stoker sales and power equipment in the western territory. On January 1, 1919. he became western sales manager for the Stanford Riley Stoker Company and the Murphy Iron Works., Chicago. He became vice-president of the Riley organization in 1927.

Mr. Pestell was a Fellow of the American Institute of Electrical Engineers, and a member of the A.S.M.E., which he joined in 1919, the Western Society of Engineers, the American Electric Railway Association, and the New England Railway Club. He was a Mason and an Elk.

His wife, Jane Cameron Pestell, died in March, 1928.

Pierre Plantinga

Pierre Plantinga. president of The Gas Machinery Company, Cleveland, Ohio, died of pneumonia, on January 17, 1928. He was born at Bolsward, Holland, on December 21, 1871, and was educated in Germany where he received the degree of M.E. After a three years' apprenticeship in Germany, he entered the employ of the Karges Machine Works, Germany, as mechanical draftsman in 1892. He came to the United States in 1893 to attend the World's Fair at Chicago and while here became associated with the Western Gas Construction Company, Fort Wayne, Ind., first as assistant mechanical engineer and later as engineer and secretary. In 1902 he was one of the incorporators of The Gas Machinery Company, builders of gas works for supplying communities with gas.

He was a member of the American Gas Association, the German-American Technical Society, and of the A.S.M.E., of which he became a junior member in 1894 and a full member in 1925.

Ysidoro Ignacio Polledo

Ysidoro Ignacio Polledo was born at Matanzas, Cuba, on July 31, 1865. He was graduated from the School of Mines, Columbia University, with the class of 1885 as an engineer of mines, and became assistant engineer on the Survey for Waterworks for the City of Santiago de Cuba. From 1886 to 1889 he was assistant engineer and principal assistant engineer for the Cardenas and Jucan Railroad, Cardenas, and during the following year manager of the Santa Barbara Sugar Plantations, at Baró. From 1890 to 1895, Mr. Polledo was general manager of the Cardenas Sugar Refining Co., Cardenas, and also engaged in private work as a consulting engineer in the re-designing of plants for the manufacture of sugar. From 1895 to 1897 he was assistant engineer of harbor works at Havana, Cuba, and again from 1899 to 1900. He then spent two years as technical director of the Santa Lucia Sugar Factory, a year as general manager of the Mantanzas Railroad Co., and two years as manager of the "Banco" Español de la Isla de Cuba, Havana. From 1907 to 1918 he was engaged in private work as a consulting engineer. He then served for a year as vice-president and general manager of Ferrocarril del Norte de Cuba, after which he became vice-president of the Regla Coal & Oil Co. of Cuba, the position which he held at the time of his death.

Mr. Polledo was a member of the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, and the American Society of Mechanical Engineers, of which he became a junior in 1888 and a full member in 1916. He died on May 7, 1928, at the Memorial Hospital, New York.

Fred M. Prescott

Fred M. Prescott, president of The Prescott Company, manufacturer of pumping equipment and sawmill machinery, died at his home in Menominee, Mich., on October 17, 1928. Mr. Prescott was born in Denver, Colo, on September 30, 1863. After serving an apprenticeship at the Marinette Iron Works Co., he entered Cornell University, from which he was graduated in 1885. He secured shop experience with David Foster & Co., Tacoma, Wash.

Soon after his graduation from Cornell in 1885, Mr. Prescott engaged in the mining supply and heavy hardware business at Ironwood, Mich., and, as manufacturers' agent furnished mines with many of the hoisting machinery plants and most of the underground pumping equipment.

Underground pumping being at that time in its infancy so far as deep mines were concerned, Mr. Prescott began to specialize on steam pump construction and the development of higher efficiency machines, acquiring wide experience in mine pumping. In 1904 he removed to Milwaukee, which offered superior manufacturing and shipping facilities, and formed the Fred M. Prescott Steam Pump Company. In 1910 this company became a part of the International Steam Pump Company of New York. He withdrew from the concern two years later.

About this time, a new condition arose which greatly interested Mr. Prescott. Up to then practically all pumps had been steam driven, but suddenly the mines began to electrify, coming about so rapidly that an entire new line of electrically driven pumps were in demand. For heavy pressures and large gallonages, this presented new problems and, in order to develop his ideas on this form of pumping, Mr. Prescott acquired the controlling interest in the Prescott Company shops in Menominee, which was founded in 1867 and devoted to the building of heavy sawmill machinery.

The development of electric and power driven pumps was so successful that Mr. Prescott moved to Menominee in 1914 and devoted all of his time to the new industry.

Mr. Prescott was prominently interested in all activities tending to the welfare and development of Menominee. He was a director of the First National Bank, a past president of the Menominee Rotary Club, a member of the Riverside Country Club, and was its president when that club was reorganized about six years ago. Mr. Prescott was affiliated with a number of other clubs throughout the country. He was a 32d degree Mason.

Mr. Prescott became a member of the A.S.M.E. in 1901 and served as a manager from 1905 to 1908. He also belonged to the Lake Superior Mining Institute and served on the Board of Control of the Michigan College of Mining and Technology. He was affiliated with the Presbyterian Church.

F. Patterson Prindle

F. Patterson Prindle, who became a junior member of the A.S.M.E. in 1926, died on November 3, 1928.

Mr. Prindle was born at Orange, N. J., on January 6, 1903. He attended the East Orange High School, where he did post-graduate work for a year before entering Syracuse University. He received a mechanical engineering degree from that institution in 1925.

During his summer vacations Mr. Prindle worked with the Delaware, Lackawanna & Hudson R. R. Co., and M. T. Davidson Co. Following his graduation he became engineer for the Pneuvac Company, West Hoboken, N. J.

Alfred M. Randolph

Alfred M. Randolph, whose death occurred on December 12, 1927, was born on March 27, 1868, at Baltimore, Md. He attended public and private schools there and in 1887 entered Johns Hopkins University, where he received the degree of Bachelor of Arts in 1891 and one in electrical engineering three years later. He then took a three-year student's course in the shops of the Westinghouse Elec. & Mfg. Co., Pittsburgh, after which he worked in the Record, Experimental, and Electric Engineering Departments until 1902. At that time he was transferred to the British Westinghouse Elec. & Mfg. Co., in Manchester, England, which has subsequently become the Metropolitan-Vickers Electric Company. He remained in England until 1919, during which time he served as engineer, assistant superintendent, superintendent, and manager of the Detail Engineering Department.

Mr. Randolph returned to the United States in 1919, principally on account of poor health, and from that date until his death acted as consulting engineer and as a special representative of the Metropolitan-Vickers Company in the United States.

Two prominent installations with which Mr. Randolph was closely identified are those of the Missouri River Power Company and the Glasgow Tramway Corporation, Scotland.

Mr. Randolph became a member of the A.S.M.E. in 1925. He also belonged to a number of other engineering and scientific societies in the United States.

Edward Charles Riklin

Edward Charles Riklin, who died in Tonawanda, N. Y., on December 9, 1928, was a native of Zurich, Switzerland, where he was born in February, 1877. He was graduated from the University of Switzerland with an M.E. degree in 1901 and gained his first professional experience as mechanical engineer with the Sulzer Bros., Winterthur, Switzerland.

Mr. Riklin came to the United States in 1903 and spent some time in New York, Rochester, and Chicago, after which he became connected with the Byron, Jackson Machine Works, in San Francisco, Cal., as designer. In 1906 he accepted a position as mechanical engineer with Henry R. Worthington, in Harrison, N. J., where he remained for three years. In 1909 he became chief engineer for the Buffalo Steam Pump Company, Buffalo, N. Y., and remained with that concern until his death. He first took charge of the centrifugal pump department, and since 1915 had been in charge of the entire engineering departments of the firm and was responsible for the design of the various types of pumps which it manufactured.

Mr. Riklin became a member of the A.S.M.E. in 1920. He is survived by his widow, Mrs. Anne M. Riklin.

Theodore Charles Roberts

Theodore Charles Roberts, consulting engineer, and a member of the A.S.M.E. since 1916, died suddenly on September 28, 1928, and his home in New York.

Mr. Roberts was a native of New Orleans, La., where he was born in December, 1875. After completing his grade school work there, he entered upon an electrical engineering course at Tulane University, supplementing this later with a further special course in electrical engineering at Colorado College.

From 1892 to 1900 he was employed as field engineer and construction superintendent for the Colorado Bell Telephone Company, Canon City, Colo.; superintendent of the Canon City Light, Heat and Power Company; manager of several combined exchanges for the Colorado Bell Telephone Company at Florence, Colo.; and construction superintendent and engineer for the Telluride Power Company, where he worked with Mr. Ralph D. Mershon on high-tension experimental work.

His subsequent electrical activities included service as electrical engineer for the United States Reduction and Refining Company, Colorado City, Colo., in charge of design and construction; chief electrical engineer and master mechanic for the American Smelting & Refining Co., Leadville and Pueblo, Colo.; chief engineer for the Arkansas Valley Railway Light & Power Co. at Pueblo; and four years as chief engineer of the United Verde Copper Co., the United Verde & Pacific Railway Co., the Verde Tunnel & Smelter Railroad Co., and the Upper Verde Public Utilities Co., in designing and constructing railroad equipment aggregating approximately ten million dollars in value.

Mr. Roberts was closely associated with the Guggenheim interests in Colorado and also was chief engineer for the H. M. Byllesby Company. While in Arizona, he was identified with the interests of the late Senator William A. Clark. During the World War, he was engaged in the manufacture of chemicals and dyes, and subsequent to that period, he was chosen assistant to the president of the Columbia Graphophone Mfg. Company, New York. Since 1923, Mr. Roberts had devoted the most of his time to consulting engineering and the writing of scientific articles. He was a member of all of the four national engineering societies — civil, mechanical, mining and electrical — a 32d degree Mason, and belonged to a number of clubs.

Mr. Roberts is survived by his widow, Dr. Marion Wall Roberts, and a daughter. A son, Theodore, Jr., died in 1919.

Orlando J. Root

Orlando J. Root was born at Bay City, Michigan, on September 14, 1869. He received his technical training at the Michigan Agricultural College from which he received a B.S. degree in engineering in 1889. For three years he was superintendent of the Lansing Iron and Engine Works. Later he became assistant superintendent of the Watertown Steam Engine Company, Watertown, N. Y., where he remained for three and one-half years until he became vice-president of the Root & Van Dervoort Engineering Corpn., East Moline, Ill., with which he was connected for twelve years. For more than twenty-five years he was part-owner of The Standard Calorimeter Company, East Moline, Ill., and was actively associated with this concern at the time of his death on February 16, 1928.

Mr. Root became a member of the A.S.M.E. in 1898.

Peter Schwamb

Peter Schwamb, who died suddenly at his home in Arlington, Mass., on November 3, 1928, was for twenty-seven years a member of the mechanical engineering faculty of the Massachusetts Institute of Technology. He was born in Arlington on February 13, 1858. He received a B.S. degree from M.I.T. in 1878 and did post-graduate work during the following year. He then worked for four years as draftsman for the Howe Scale Company Rutland, Vt., and the Hinckley Locomotive Works, Boston, Mass.

During his long association with M.I.T. Professor Schwamb advanced from instructor in the Department of Mechanical Engineering and director of the workshops to professor of mechanical engineering and head of the Department of Mechanic Arts. He resigned in 1911, and from that time until he retired in 1926, devoted himself to the Theodore Schwamb Company, piano case manufacturers in Arlington, of which he had been treasurer since 1897.

Professor Schwamb had been active in Arlington public affairs, having served on the school committee and water board, and as chairman of the Board of Public Works from 1904 to 1907. Jointly with his sister he gave a playground for the Cutter Grammar School, which he had attended when a boy.

Professor Schwamb was the joint author with Prof. A. L. Merrill in 1904 of the textbook "Elements of Mechanism." He served as consulting engineer in the construction of the mounting of the one-hundred inch reflector at the Mount Wilson Observatory in California, and many other important works.

In addition to his membership in the A.S.M.E., which he joined in 1884, Professor Schwamb belonged to the Boston Society of Civil Engineers, the Japan Society, and a number of professional, historic, and scientific organizations in Boston and Arlington, and was a fellow of the American Academy of Arts and Sciences. He belonged to the Unitarian Church.

Professor Schwamb had travelled extensively both in this country and abroad, and had made one trip around the world.

Professor Schwamb leaves his widow, Amy E. (Bailey) Schwamb, whom he married in 1893, and a daughter and two sons.

William Schwanhausser

William Schwanhausser chief engineer of the Worthington Pump and Machinery Corporation, died on January 15, 1928, in Peck Memorial Hospital, Brooklyn, N. Y., after an illness of six months.

Mr. Schwanhausser was born in Wurzburg, Bavaria, on September 20, 1854, and received his public school education in his native city. Prior to entering the Polytechnic Institute at Mittweida, Saxony, he served an apprenticeship at the works of Reck and Joachim, Schweinfust, Bavaria, manufacturers of sugar machinery and its accessories. He was graduated from the Polytechnic Institute in 1874 with the degree of mechanical engineer. Shortly thereafter he came to the United States and found employment as a draftsman with Osterheld and Eichemeyer at Yonkers, N. Y., manufacturers of special machinery for producing wool and felt hats, etc. He also assisted in the development of engines, pumps, typewriters, the Eichemeyer electric motor, and mowers and reapers for agricultural use.

At this time the works of the Otis Elevator Company were located in Yonkers and Mr. Schwanhausser was given an opportunity to prepare an article for Appleton's Encyclopædia of Applied Mechanics on the development of passenger and freight elevators produced by that company. This led to a permanent engagement with the company in 1876, first as a draftsman, then as chief of the drawing-room, and later as assistant general superintendent. For a period of eight years he gave his entire energy to the development of the hydraulic elevator, then in its infancy, and it was due to his persistent efforts that this type of elevator was made successful.

In April, 1885, Mr. Schwanhausser became connected with Henry R. Worthington as assistant superintendent, and was placed in charge of the manufacture of trade pumps, at the Worthington Hydraulic Works, then in Brooklyn. He introduced new methods of production by the use of single purpose machines, resulting in increased output with decreased cost, and insuring standardized product. This was one of the first applications of special machinery to this end and marked a new era in large scale manufacturing.

In 1895 he was placed at the head of the Worthington interests in Germany and as associate director of the other Worthington continental companies visited Paris, Vienna, Budapest, and Petrograd at regular intervals, thereby establishing close coöperation between the various branches and the home office of the company.

In February, 1901, or shortly after the formation of the International Steam Pump Company, a merger of the Worthington and other pump manufacturers, Mr. Schwanhausser was recalled to the United States to become general manager for Henry R. Worthington. In this capacity he served until 1906. In 1903 he revisited Europe to investigate the development of high-pressure multi-stage centrifugal pumps.

Mr. Schwanhausser was appointed chief and consulting engineer of the International Steam Pump Company in 1906, with headquarters in New York. His duties were manifold in new fields of product, water works installations, patent research, and in the study for the production of ammunition for the Allies and the United States Government during the World War. In cooperation with the works manager of the Hazelton plant an organization was built up capable of handling twenty thousand projectiles per day.

When the International Steam Pump Company was reorganized under the Worthington Pump and Machinery Corporation Mr. Schwanhausser's former appointment was confirmed.

Mr. Schwanhausser was recognized as one of the outstanding engineers of America and his professional opinion carried weight in the solution of unnumbered intricate and perplexing engineering problems. He was especially eminent in matters connected with the handling of steam and its application to superpower.

Mr. Schwanhausser joined the A.S.M.E. as a member in 1888. He also belonged to the Institute of Mechanical Engineers of Great Britain, Naval Architects of Great Britain and Germany, Verein deutscher Ingenieure, National Geographic Society, Aerial League, New York Electrical Society, and the Engineers Club of New York.

He is survived by his widow, Alice Barrington Schwanhausser, and by a daughter.

Henry L. Scott

Henry L. Scott, who died on April 27, 1928, was a native of Providence, R. I., where he was born on October 27, 1878. He attended the Providence public schools and Brown University, where he took a special mechanical course. He then served an apprenticeship as a machinist in the Eastern Engineering Company and the Simms Engineering Company. After working for a short time as draftsman for the Rhode Island Locomotive Works and then the James A. McHardy & Co., of which firm he was a member, he founded the Henry L. Scott & Co., in 1900.

Soon after the company was organized Mr. Scott began the manufacture of testing machines, and about 1906 developed the first automatic power yarn tester placed on the market in this country. He secured both American and foreign patents on a large number of machines now recognized as standard equipment for testing textiles and rubber goods. Machines which he designed are in general use by the U. S. Government and their construction has been extensively studied at the Massachusetts Institute of Technology, where the Textile Laboratory is completely equipped with them.

In addition to the A.S.M.E., of which he became a member in 1922, Mr. Scott was a member of the Textile Institute of Manchester, England, the American Society for Testing Materials, the American Cotton Association, National Cotton Manufacturers Association, Providence Engineering Society, and a number of clubs. He was a 32d degree Mason. He is survived by his widow and one child.

William Searby

William Searby was born in Bath, England, on January 17, 1872, the son of George and Elizabeth (Atkinson) Searby. He attended Dulwich College, England. At an early age he was sent to Melbourne, Australia, to join an uncle, who placed him with Connel, Hogarth & Co., a firm of wholesale grocers and tea merchants. He became homesick, however, and returned to England after six months. His father immediately apprenticed him as a sailor to John Wilson, of Glasgow, and during the years of his term he became acquainted with many of the ports of the world. His ship was in San Francisco at the time his apprenticeship terminated, and he remained in California as assistant engineer for the Alameda Sugar Company, in Alameda, and subsequently foreman of manufacture for the Union Sugar Company in Santa Barbara, until 1900.

He then accepted a position at Spreckelsville, later Puunene, on the island of Maui, as head sugar boiler for the Hawaiian Commercial & Sugar Co. In 1907 he was made superintendent of manufacture and machinery, and in 1920 vice-president, director, and assistant manager. In 1918 he was also appointed consulting engineer for American Factors, Ltd., in Honolulu.

During his years of plantation work Mr. Searby made several valuable contributions to the sugar industry. With W. G. Hall he was the joint inventor of the quadruple effect evaporator which improved the efficiency of evaporation in sugar production, and he also invented the Searby shredder, the Searby leveler for the preparation of sugar cane for milling, and a process of diffusion for cane sugar factories. He was also in charge of the first demonstration given in Hawaii to prove that white sugar could be made by the use of small quantities of vegetable charcoal.

Mr. Searby was a director of the Ahukini Terminal & Railroad Co., East Kauai Water Co., Kekaha Sugar Co., Koloa Sugar Co., Lihue Plantation Co., Waiahi Electric Co., Makee Sugar Co., Oahu Sugar Co., Waiahole Water Co., Olaa Sugar Co., Pioneer Mill Co., Lahaian Agricultural Co., Princeville Plantation Co., and Waimea Sugar Co., and a vice-president and director of Henry May & Co., and the Hawaiian Canneries Co.

He became a member of the A.S.M.E. in 1914 and belonged also to the American Chemical Society, Hawaiian Sugar Technologists Association, and a number of clubs, and the Masonic fraternity. In 1892 he married Cara Marinda Sawyer. They had one child, a daughter.

Samuel Shaw

Samuel Shaw, the son of William and Fanny Shaw, was born at Brooklyn, N. Y., on September 11, 1876. He attended public schools in Brooklyn, and, after his graduation from high school and two years at a business college, served an apprenticeship as a carpenter in New York. From 1888 to 1895 he was carpenter foreman on various undertakings in New York, among them, the construction of the first Brooklyn City Railroad power house. From 1895 to 1910 he was a general foreman and superintendent for various companies, particularly in the construction of reinforced concrete buildings.

In 1910 he entered the employ of Westinghouse, Church, Kerr & Company, Incorporated, engineers and constructors of New York, as superintendent of erection, and, until his death, on January 30, 1928, was continuously in the employ of that company and its successor, Dwight P. Robinson, Inc.

His work during the past eighteen years included construction of power plants for the Worcester (Massachusetts) Electric Light Company; York (Pennsylvania) Railway Company; Edison Electric Light Company, York, Pa.; American Brass Company, Torrington, Conn.; International Time Recording Company, Endicott, N. Y.; construction of industrial plants or additions to existing plants for Armour Fertilizer Works, Matanzas, Cuba; Hydraulic Pressed Steel Company, Cleveland, Ohio; Cleveland Brass & Copper Mills, Euclid, Ohio; Chicago Pneumatic Tool Company, Franklin, Pa.; and Chapman Valve Company, Indian Orchard, Mass. At the time of his death, Mr. Shaw was superintending the construction of a boiler plant for the Pittsburgh Plate Glass Company at Barberton, Ohio.

In 1888 Mr. Shaw married Susan Wood, who survives him.

He was elected an associate of the A.S.M.E. in 1913 and promoted to full membership in 1921. He was also a Mason.

George Edward Smith

George Edward Smith, who until his resignation in 1924 because of poor health, was chief engineer of the American Engineering Company, Philadelphia, Pa., died on March 3, 1928, of cardiac asthma, shortly after returning from a Mediterranean tour.

Mr. Smith was born in Philadelphia on September 1, 1873. He attended the Philadelphia Quaker School and Manual Training High School, and later studied law for a time at Temple University and took a course in naval architecture at the University of Glasgow, Scotland. At the time of his death he was studying ethics and astronomy at the University of Virginia.

During his professional career Mr. Smith was associated with the Jeansville Iron Works, Newport News Shipbuilding and Drydock Co., Columbia Iron Works, Neafie & Levy S. B. Co., Baltimore D. D. Co., William Cramp & Sons Ship & Engine Bldg. Co., and Smith & Robinson. He became connected with the American Engineering Company in 1912.

Since his retirement he had been engaged in orchard work in Virginia.

Mr. Smith had been a member of the A.S.M.E. since 1921, and belonged also to the American Society for Testing Materials, the Society of Naval Architects and Marine Engineers, and the Masonic fraternity. He is survived by his widow, Mary McNair Smith.

James A. Smith

James A. Smith, general superintendent of the Schenectady Works of the General Electric Company for fifteen years, and one of the most prominent Masons in the eastern United States, died on October 25, 1928, at his home in Schenectady, following a stroke suffered the night before. He is survived by his widow, Edith May (Chapman) Smith, whom he married in 1896, and by a daughter and a son.

Mr. Smith was born in Hartford, Conn., on May 25, 1873, the son of Alexander Croft Smith and Eliza Patterson (Cargill) Smith. In 1888 he entered the employ of Pratt and Whitney in Hartford, Conn., about a year later entering the apprentice shop of that company. He attended night school and took private lessons in mechanical drawing. In 1894 he was sent to Chicago to install the Pratt & Whitney exhibit at the World's Fair, and in 1900 was selected to install and demonstrate the company's exhibit at the Paris Exposition.

From 1903 to 1904 he was associated with the Corrington Air Brake Company, Matteawan, N. Y., as general superintendent, and subsequently was made superintendent of the Dutchess Tool Works at Fishkill Landing, N. Y., which position he held until he entered the employ of the General Electric Company in 1910.

His first position at the Schenectady Works was that of assistant to the mechanical superintendent. In a few months' time he was made superintendent of the motor department. He became general superintendent of the Schenectady Works in July, 1913.

Mr. Smith was one of the four active 33d degree Masons in New York State and commander-in-chief of the Albany Sovereign Consistory. He had held many high offices in the organization, which he joined in 1903. He became a member of the A.S.M.E. in 1913, and also belonged to the A.I.E.E.

Mr. Smith served in the Spanish-American War with a Connecticut regiment. He was a Presbyterian.

Philip Charles Smith

Philip Charles Smith, manager of the Vulcan Facing Company, Easton, Pa., was born in Manchester, N. H., in September, 1852, and served his apprenticeship at the molding trade in the foundries of the Amoskeag Manufacturing Company of Manchester.

On reaching his twenty-first year he moved to California and worked in various foundries on the Pacific Coast. About 1884 he started a foundry in Amesbury, Mass., which served the cotton and carriage manufacturing trade, and in this shop he made the castings for several of the high speed boats of C. D. Mosher, the pioneer designer of high speed yachts. Later he started the first foundry in Marlboro, Mass., serving the shoe factory machinery trade.

Anxious for a larger field, he connected as foundry superintendent with the B. W. Payne & Co. Engine Works at Elmira, N. Y., one of the leading builders of high speed engines of that day. While with this firm he also entered the field of engine salesmanship, and about 1890 was one of the organizers of the Troy Engine & Machine Co., which has since become a leading manufacturer of high speed steam engines.

About 1892 he became superintendent of foundries of the old Camden Iron Works, at the time they took over the manufacture of the extensive line of hydraulic machinery of Platt & Son of Gloucester, England, in addition to their original line of gas, hydraulic, sugar and chemical works products. He left there to become general superintendent of the Radford Pipe and Foundry Co., of Radford, Va., one of the pioneer pipe and large casting companies of the South. Returning North he entered the employ of the Ingersoll Rand Co., Phillipsburg, N. J., as superintendent of foundries, a position he held for many years.

While with the Payne Engine Co., he was associated with the late Harris Tabor in the development of the molding machine, and in recent years, with the late A. S. Ineson, he devised various improvements to ramming and jarring machines.

In Mr. Smith's earlier life he was a frequent contributor to the technical press, and a recognized authority on cupola practice, the section on this subject in a standard mechanical engineering handbook being quoted from one of his contributions to the *American Machinist.*

He was a charter member of the Easton Elks, and a devoted fisherman. He became a member of the A.S.M.E. in 1916.

Mr. Smith had a large family, and two sons followed the foundry business; one, Arthur C., is superintendent of a foundry in Birmingham, Ala., and Everette E. is a foundry consultant of Easton and Pittsburgh.

His death, from influenza and complications following, occurred on May 22, 1928.

Ira Hobart Spencer

Ira Hobart Spencer, one of the leading authorities on compressed air machines and turbines, died at the Hartford, Conn., Hospital on April 28, 1928, after a short illness.

Mr. Spencer was born in Barkhamsted, Conn., in June 1873, the son of Uriel and Harriet (Blackman) Spencer. He attended the public schools of Hartford and Winsted and while still a boy experimented in water motors and air compression engines. In 1892 he patented a hydraulic motor for church organs and organized the Spencer Motor Co. (later the Organ Power Co.), of Hartford. He next turned his attention toward electric fan blowers or organ bellows, and later developed central vacuum cleaning machines for use in theaters, apartment houses, and other large buildings. The Spencer Turbine Cleaner Company was incorporated in 1907, and consolidated with the Spencer Organ Power Company in 1918 to form the Spencer Turbine Company. A large number of patents in these fields were secured by Mr. Spencer.

During the World War Mr. Spencer was active in an advisory capacity to the Government on matters pertaining to turbine engines. He took an interest in local affairs and belonged to several clubs in Hartford. He became a member of the A.S.M.E. in 1913.

Mr. Spencer is survived by his widow, Catherine Monks Spencer, and by one daughter.

Joseph Allison Steinmetz

Joseph Allison Steinmetz was born on March 22, 1870, in Philadelphia, Pa. His parents were John and Frances Morris (Janney) Steinmetz. He attended the Philadelphia Central High School and took a special course in mineralogy and metallurgy at Lehigh University.

He had been associated with the Aluminum Company of America as special representative in the use of aluminum in steel metallurgy, and as president and designing expert with the Steel Specialties Company, Milton, Pa., manufacturers of Steinmetz patents and seamless steel "Jasco" gasoline and air pressure tanks. His activity with the firm of Janney, Steinmetz & Co., Philadelphia, which he founded in 1908, came to an end at the close of 1927, when illness necessitated his retirement. A Southern trip failed to improve his health, and he died at his home at Mt. Airy, a suburb of Philadelphia, on July 11, 1928.

At the time of his death Mr. Steinmetz was president of Steinmetz & Co., Inc., Philadelphia, and a director of the Globar Corporation, Niagara Falls, N. Y., and was associated with the Steinmetz Heating Company, Inc., New York, and the American Car and Foundry Company, Milton Pa.

Mr. Steinmetz was an assistant of Prof. Samuel P. Langley in producing special parts for the early airplane engines in 1900, and was regarded as a pioneer in the advancement of flying. In 1914 he began to work out a series of anti-aircraft devices, among which was the hook bomb, adopted by the French to use in repelling Zeppelin attacks. When the United States entered the World War Steinmetz was appointed a member of the engineering division of the National Research Council, and made a study of airplane construction in England and France for the War Industries Survey.

In addition to his anti-aircraft inventions he had patented devices for use against submarines, and he located Hog Island as the site for a war shipyard. Shortly before the Armistice he received a commission as Major in the Ordnance Reserve Corps, and since then had been made Lieutenant-Colonel. He had served as president of the Aero Club of Philadelphia, was a member of the Submarine Defense Association of New York, and was the founder and director of the School of Aircraft Building in Philadelphia.

Colonel Steinmetz was a member of the Society of Automotive Engineers, Franklin Institute, Compressed Gas Manufacturers' Association, American Electro-Chemical Society, and A.S.M.E., which he joined in 1914. He was president of the Engineers Club of Philadelphia in 1919-1920, and belonged to a number of other clubs and organizations. He made a hobby of stamp collections, belonged to the Royal Philatelic Society of Great Britain, and was president of the Aero Philatelic Society of America.

He is survived by his widow, Orma Frances (Field) Steinmetz, whom he married in 1903, and by a son and a daughter.

Robert Clark Stevens

Robert Clark Stevens was born in Malone, Franklin County, N. Y., on September 5, 1871. His death occurred while he was on a business trip, in Bayport, Minn., on May 6, 1928. He is survived by his widow, Minnie E. Walls, whom he married in 1903, and by one daughter.

Mr. Stevens was graduated from Franklin Academy in 1889, attended Hamilton College for two years, and then transferred to the University of Michigan, where he was graduated with an A.B. degree in 1894 and obtained his B.S. in 1895.

For the next three years he was employed as draftsman and engineer by the Atlas Engine Works, Indianapolis, Ind., with which he was also connected from 1900 to 1904 as engineer and from 1904 to 1906 as chief engineer and assistant superintendent. In the intervening time he was engaged in consulting engineering work as a member of the firm of Giddings & Stevens, Rockford, Ill., and for a year taught mechanical engineering at the University of Michigan. In 1906 he removed to Erie, Pa., were he accepted a position as chief engineer for the Skinner Engine Company. In 1919 he established his own office as consulting engineer for the Skinner Engine Company and others, specializing in unaflow engine design, operation, and tests, and power plant inspection, construction, and improvement.

Mr. Stevens joined the A.S.M.E. as a junior in 1899 and was promoted to full membership in 1906. He was also a member of the Engineer's Society of Northwestern Pennsylvania and the Masonic fraternity, and was a Unitarian.

Charles A. Stickney

Charles A. Stickney was born in St. Paul, Minn., on September 11, 1876, the son of Alpheus Beede and Kate Wilt (Hall) Stickney. He attended the St Paul schools and the Northwestern Military Academy and later spent a term at the Massachusetts Institute of Technology. He then went to work on the Chicago Great Western Railroad, of which his father was president.

In 1899 Mr. Stickney formed the Charles A. Stickney Co., of St. Paul, for the manufacture of gas engines and pumps of his design. In 1914 he went to Chicago, and in 1916 to Chattanooga, Tenn., where he was managing partner of Stickney Montague, making an addressing machine. He designed a wrecking machine for the U. S. Government during the World War, but the Armistice was signed before manufacturing had been begun. For a time he was owner of a factory in Peterboro, Ontario, Canada. Subsequently he manufactured a pencil which he had designed and then engaged for a time in real estate business in California. Returning to St. Paul, he designed machinery for Silas Ford, after which he was connected with the National Automatic Tool Company in Richmond, Ind., in design work. He spent the last four years of his life in Rockford, where he first designed machines for the Rockford Drilling Machine Company, and later for the Burson Hosiery Company. He founded the Rockford Research Laboratory, and at the time of his death was working for the Stover Mfg. Co. in Freeport, Ill.

Mr. Stickney became a member of the A.S.M.E. in 1913, and belonged to various social and country clubs. His death occurred on May 16, 1928, after a brief illness. His widow, Edith Pierpont (Jones) Stickney, whom he married in 1898, and four of their five children survive him.

E. Platt Stratton

E. Platt Stratton, retired marine engineer, naval architect, and inventor, died on March 22, 1928, at the home of a daughter in Garden City, L. I., N. Y. Mr. Stratton was born at College Point, L. I., on June 12, 1884, the son of Platt and Elizabeth Hewlett (Jones) Stratton. He was educated at Walnut Hill Academy, Geneva, N. Y., and at the Flushing Institute. He married Harriet Louise Woodhull and had two daughters. He retired from business in 1918, when he was stricken with paralysis.

At the age of eighteen Mr. Stratton entered the engineering department of the Morgan Iron Works of New York, where he remained for five years. He was at sea with the New York Mail Steamship Company for a year, chief engineer for the New York and West India Steamship Company for two years, and a U. S. inspector of steam vessels in the Port of New York for nine years. From 1879 to 1881 he acted as receiver for the Farmers Loan & Trust Co. of the Maxwell Land & Railroad Co. of New Mexico. During the next three years he was marine engineer for the Babcock & Wilcox Co. of New York. He then spent four years as expert for the New York Board of Marine Underwriters, whom he continued to serve for many years as consulting engineer, and for whom he visited ports on the Pacific and Southern Coasts and made frequent trips to England and France. In 1890 he also became chief engineer and surveyor for the American Bureau of Shipping (American Lloyds) and was a member of the board of managers.

Mr. Stratton invented and patented the Stratton separator, a device for the elimination of entrained water from steam, as well as methods for preventing slides in the Panama and other canals. He organized a company to build a tunnel under the East River, New York, subsequently disposing of the rights to the Steinway interests. The steamships *St. Paul* and *St. Louis* of the American Line were built under his supervision, and he supervised cutting in half and lengthening the steamship *Allianca,* the first ship to pass through the Panama Canal. He prepared a report for the Department of Commerce on standardization in the construction of freight ships.

In addition to his membership in the A.S.M.E., which began in 1883, Mr. Stratton held membership in the Society of Naval Architects and Marine Engineers, Institute of Naval Architects of Great Britain, New York Waterways Association, Flushing Historical Society, Engineers' Club of New York, and other clubs and societies.

Albert A. Straub

Albert A. Straub was born at Portsmouth, Ohio, on February 17, 1884, and died after a brief illness with pneumonia at the Beekman Street Hospital, New York, on May 7, 1928. Mr. Straub obtained his engineering education at the Ohio State University, receiving the degree of mechanical engineer in 1906, and during the next year was an assistant in mechanical engineering and did post-graduate work there. During his vacations from college he secured drawing-room experience with the Ironton Engine Company, Ironton, Ohio, and spent a summer with the Jeffrey Mfg. Co., Columbus, Ohio, in charge of boiler tests. Following the completion of his work at the University he was connected with the Pittsburgh Plate Glass Co., and subsequently with the Panama Railroad Steamship Company, New York, for which he established a system for the inspection of coal.

For several years Mr. Straub was connected with the technologic branch of the U. S. Geological Survey, and was employed as assistant engineer by the Bureau of Mines. From 1911 to 1916 he was assistant chief engineer of power stations for the Pittsburgh Railways Company and steam engineer for Duquesne Light Company, engaged in power plant, fuel economy, and smoke abatement work. After some general work along these same lines he became associated in 1918 with the Westinghouse Electric & Mfg. Co., as testing engineer in the stoker department and was engaged in field tests, elimination of operating troubles, and development work.

Mr. Straub was next requested by the Bureau of Mines to study the amount and composition of exhaust gases discharged by motor vehicles and the ventilation of vehicular tunnels. After these investigations had been completed he was in the service department of the Babcock & Wilcox Company until 1923, when he entered the plant betterment division of the Electric Bond and Share Company, New York, with which company he was associated at the time of his death.

Mr. Straub contributed to a number of engineering journals and as joint author of various papers issued by the Bureau of Mines. He became a junior member of the A.S.M.E. in 1911 and a member in 1921.

John Eli Symons

John Eli Symons, who was born near Farmland, Randolph County, Ind., on July 1, 1875, died on June 5, 1928, at his home in New Haven Conn. He secured his education in public schools, supplemented later with private instruction. He then served an apprenticeship as a machinist in the shops of the Atkinson, Topeka & Santa Fe Ry., Ft. Madison, Iowa, and subsequently was employed as a machinist at the Midwest Engine Works and the Atlas Engine Works, Indianapolis, Ind.

In 1898 he became foreman of the machine shop and erecting shop of the American Locomotive Company, Richmond, Va., and two years later locomotive foreman on the Seaboard Air Line Railway at Richmond. In 1902 he entered the employ of the Gulf, Colorado and Santa Fe Railway at Cleburne, Texas, as general foreman, and was promoted to the position of division master mechanic, with extended jurisdiction over certain other group lines during Federal control. In 1920 he became associated with The Texas Company as superintendent of the mechanical-expert department at Houston, Texas, and a year later was transferred to New York in the same capacity. He entered the employ of the New York, New Haven & Hartford R. R. in 1924 as roundhouse foreman and the following year was appointed chief inspector of the marine, or floating equipment of that road, which position he held at the time of his death.

Mr. Symons became a member of the A.S.M.E. in 1922, and also belonged to the Franklin Institute and the Masonic fraternity.

Lawrence A. Taylor

Lawrence A. Taylor, chemical engineer, vice-president, and general manager of the Sharples Specialty Company, San Francisco, Cal., died on September 23, 1928, as the result of burns received while perfecting a new process for reclaiming used automobile oils. The accident occurred at the plant of the Industrial Lubricants, in San Francisco.

Mr. Taylor was born in Brookville, Kan., on September 22, 1887. He attended high school in Hays, Kan., and later was a special student at Purdue University. He spent a year as machinist and service man for the Haines Auto Co., in Minneapolis, Minn., and from 1906 to 1912 was connected with the White Motor Truck Co., first as shop foreman for various agencies and later as travelling service superintendent for the Chicago office. After a year as assistant to the superintendent of motor car repair for the Southern Pacific Co., Portland, Ore., Mr. Taylor went into the automobile repair business for himself in that city. In 1916 he was placed in charge of Pacific Coast sales and installation of power-driven centrifugal machinery for creameries, and the following year became sales engineer for Fairbanks, Morse & Co., in Portland.

His association with Sharples Company began in 1920 when he accepted a position as designing and test engineer. He was appointed general manager in 1922, and under his direction special centrifugal machinery and auxiliary apparatus was designed and installed in the many Pacific Coast motorships. He also developed numerous processes dealing with mineral, vegetable, and animal oils, including the Sharples process for the production of olive oil in a fresh condition.

Mr. Taylor became a member of the A.S.M.E. in 1927. He is survived by his widow, Maude J. Taylor.

Paul Huse Taylor

Paul Huse Taylor, vice-president of Mason & Hamlin Co., Boston, Mass., with which he had been connected for several years, died in July, 1928. He was born at Wakefield, Mass., on August 21, 1892. He received an S.B. degree in mechanical engineering from the Massachusetts Institute of Technology in 1916. He became a junior member of the A.S.M.E. in that year and an associate member in 1920.

Prior to the completion of his college course Mr. Taylor had done some work for the Hotel Beaconsfield, in Brookline, in connection with its central heating plant, made some tests of the power plant of the Reading Rubber Co., and spent some time in steam station design with Hollis French and Allen Hubbard, Boston. He had also done some work for Richardson & Hale, Boston, and following his graduation was assistant engineer for that company until February, 1917. He then became assistant to the general manufacturing manager of Bird & Son. Inc., East Walpole, Mass., but left to become Captain in the Ordnance Department during the World War. He served as commanding officer of the 26th Division Mobile Ordnance Repair Shops and as inspector of artillery of the First Army. He received three citations for exceptionally meritorious service.

Following the War Mr. Taylor returned to the employ of Bird & Son for a time before joining the Mason & Hamlin Co.

Charles Thoma, Jr.

Charles Thoma, Jr., whose death resulted from appendicitis on March 6, 1928, was a native of Jersey City, N. J., where he was born on February 26, 1884. He attended the Pratt Institute and then served an apprenticeship with E. W. Bliss Co., Brooklyn. He remained in the employ of this company throughout his life, with the exception of eighteen months prior to his death, when he was given leave of absence to reorganize the Can Department of the Anglo Mexican Petroleum Company in Mexico. He was made superintendent of the Die Department of the Bliss company in 1909.

At the time of his death Mr. Thomas was cooperating with his brother in the production of an extruded zinc nail.

Mr. Thoma became a junior member of the A.S.M.E. in 1910 and an associate member four years later.

Walter Stott Timmis

Walter Stott Timmis, architect and engineer, New York, N. Y., died on April 4, 1928. Mr. Timmis was born in Crewe, England, on June 29, 1870, the son of John and Caroline (Stott) Timmis. He secured his early education in Wolverhampton and London, and took a seven-year course in mechanical engineering in Wolverhampton Technical College. He then served an apprenticeship in the pattern shops and drafting departments of Joseph Evans & Sons, and worked for that company until 1893, when he came to the United States.

His first connection in this country was with the American Engine Company at Bound Brook, N. J., and it was there that he organized the pattern shops and foundry supply business of Timmis & Clissold, a business which is still active. Other early positions were with Walter Scott & Co., Plainsfield, N. J., R. Hoe & Co., New York, and Sackett & Wilhelms Lithographing & Printing Co. During this period Mr. Timmis was very active in designing printing, lithographing, typesetting, and stereotyping machinery, taking out several important patents in this field. He also devoted considerable time to the development of coal-handling machinery, engines, boilers, pumps and steam specialties. All of the shop work on these developments was done under his personal supervision.

Mr. Timmis served as consulting engineer on several important building projects prior to 1904, and prepared the plans and specifications for all mechanical and electrical features and supervised the entire construction of several buildings. In 1904 he opened his own office as consulting engineer. He designed and supervised the construction of power plants, heating and ventilating systems, refrigeration and fire systems, etc. In 1910 he made a preliminary and comprehensive survey covering the proposed mechanical installation at Vassar College, and from 1911 to 1915 he was consulting engineer for Harvard University in charge of the engineering courses.

During the World War Mr. Timmis served on several important committees, including a committee to investigate the heating, ventilation, and humidification of battleships and submarines for the U. S. Navy. He was consultant on the heating system for Camp Upton and manager of the Powder Apparatus Department of the U. S. Smokeless Powder Plant, at Nitro, W. Va.

For ten years, from 1914 to 1924, Mr. Timmis was senior partner of the firm of Timmis & Chapman, architects and engineers, specializing in the design and supervision of the erection of manufacturing buildings and equipment. After this partnership was dissolved in 1924, Mr. Timmis continued to serve many concerns as architect and engineer, and completed a number of important buildings, including the Travelers Insurance Building, Hartford, Conn., and the Argus Printing Building, Albany, N. Y. He was retained by many firms, particularly in the printing industry, to make surveys of their business and to arbitrate various disputes.

Mr. Timmis became a member of the A.S.M.E. in 1906, and had served as a member of its membership committee and also as a member of its Metropolitan Section committee to cooperate with the N. Y. Board of Education.

He was also active in the American Society of Heating & Ventilating Engineers, of which he was president in 1919, and had been vice-chairman of the New York Building Congress Standards Committee. He was a member of the American Association for the Advancement of Science and of the Masonic fraternity, as well as of several clubs in New York and vicinity.

Mr. Timmis is survived by his widow, one son, and two daughters.

George E. Titcomb

George E. Titcomb, vice-president of the McMyler-Interstate Co., Bedford, Ohio, died on April 1, 1928. Mr. Titcomb was born in Boston, Mass., on August 24, 1865, the son of Theodore (Pike) and Charles H. Titcomb. He was educated in the public schools of Boston and of Newark, N. J., where he was graduated from high school. He served a four-year apprenticeship with the Domestic Sewing Machine Co., and secured shop experience with the Standard Sewing Machine Co., Cleveland, Ohio, and drafting-room experience with the Yale and Towne Manufacturing Company, Stamford, Conn.

In 1891 he entered the employ of the McMyler Manufacturing Co., Cleveland, as a draftsman, remaining with that concern until 1901, having advanced to the position of chief engineer. During this period he developed much that was new in coal and ore-handling machinery. For the next ten years he held the position of sales manager and vice-president of the Dodge Coal Storage Co., Philadelphia, resigning to enter the organization of the McMyler-Interstate Co., Bedford, Ohio, as its eastern sales manager. In 1925 he became vice-president of the firm, which position he held at the time of his death.

Mr. Titcomb was a recognized authority on dock and harbor equipment for the handling of coal and ore as well as bulk and packet freight, and was a frequent contributor to the technical press of articles in this field. He became a member of the A.S.M.E. in 1908. He was also a member of the Union League Club of Philadelphia and the Machinery Club of New York City. He is survived by his widow, Anna Hesse Titcomb, whom he married in 1891, two sons, and a daughter.

Morris Moxey Titterington

Morris Moxey Titterington died on July 11, 1928, in an airplane accident near Pottsville, Pa., while on the way from New York to Williamsport, Pa., where he had intended to make the first stop on a trip to Texas. An investigation indicated that the plane had been hit by lightning.

Mr. Titterington was born on July 20, 1891, at Paris, Texas. He attended the public schools in Dallas and took courses at Dallas University and at the Bliss Electrical School in Washington, D. C. After obtaining some shop experience in Dallas he served an apprenticeship with the Sperry Gyroscope Company at Hammondsport, N. Y., and subsequently became connected with the Curtiss Aeroplane Company there and took a flying course at the Curtiss Flying School. After that he worked on the design and construction of airplane stabilizers for the Sperry Company for a time and was in charge of the development of various airplane instruments in Europe and this country.

In 1920 Mr. Titterington became chief engineer for the Pioneer Instrument Company, Brooklyn, N. Y., in charge of the design and development of aircraft instruments. Among the instruments developed by him are the earth inductor compass, turn indicator, flight indicator, air-speed indicator, altimeter, rate-of-climb indicator, bomb sight, etc. He was testing a number of inventions on the airplane in which he crashed.

Mr. Titterington became a junior member of the A.S.M.E. in 1918 and a full member in 1925.

Robert I. Todd

Robert I. Todd was born at Lakewood, N. J., on November 29, 1869, the son of Francis Makemie and Mary Catherine (Titus) Todd. He received his preliminary education in the public schools, and was graduated from Johns

Hopkins University in 1893 with the degree of electrical engineer. During his college course he gained practical experience working in the shops in Baltimore and for the Raleigh (North Carolina) Traction Company, one of the first electric railway lines in the United States.

Mr. Todd began his professional career as electrical engineer and superintendent of the Eckington & Soldiers' Home Railway Company, Washington, D. C., which later consolidated into the City & Suburban Railway Company and afterwards became the Washington Railway & Electric Company. In 1899 he left this company to become chief engineer of the American Air Power Company, New York, which had undertaken the development of compressed air motors for the Metropolitan Street Railway Company in New York. He subsequently became more directly connected with the Metropolitan Company, being associated with Milton Gerry Starrett, who was then chief engineer.

In 1900 Mr. Todd went to Pittsburgh as master mechanic in charge of the shops and power houses of the Consolidated Street Railways, now included in the system of the Pittsburgh Railways Company. Early in the following year he was chosen vice-president and general manager of the Cincinnati Traction Company, leaving this position in 1902 to assume general supervision of the engineering work of the electric railway properties of the United Gas Improvement Company of Philadelphia, Pa., particularly in connection with the Connecticut and Rhode Island properties which were purchased by the United Gas Improvement Company, and later taken over by the New York, New Haven & Hartford Railroad Company. He was appointed general manager of the Rhode Island Company in 1903. This company controlled the city lines in Providence and adjoining cities, as well as suburban lines of the Rhode Island Suburban & Interstate Railway. During his connection with these lines Mr. Todd supervised the construction of the Manchester Street Power Station.

At the beginning of 1906 Mr. Todd went to Indianapolis, Ind., to become vice-president and general manager of the Indianapolis Traction & Terminal Company (now the Indianapolis Street Railway Company), and when the Terre Haute, Indianapolis & Eastern Traction Company was organized, in 1907, he also became vice-president and general manager of that company.

At the time of his death on July 12, 1928, Mr. Todd was president of the Indianapolis Street Railway Company, the Terre Haute, Indianapolis & Eastern Traction Company, the Indianapolis & Northwestern Traction Company, the Indianapolis & Martinsville Rapid Transit Company, the Indiana Motor Transit Company, and the United Tractions Coal Company; vice-president of the Terre Haute Traction & Light Company, the Shirley Realty Company, the Indianapolis, Crawfordsville & Danville Electric Railway Company, and the Car Trust Equipment Company; and was a director in the Chicago, South Bend & Northern Indiana Railroad Company, the Terminal Realty Corporation, the Central Indiana Power Company, the Indiana Electric Corporation, the Northern Indiana Power Company, and the Wabash Valley Electric Company. He was president also of the Broad Ripple Traction Company, the Indianapolis & Eastern Railway Company, the Indianapolis & Greenfield Rapid Transit Company, and the Arcade Realty Company.

Among the engineering works accomplished by Mr. Todd was the construction of the West Tenth Street Power Station at Indianapolis in 1910, and plans for the modernizing of this station to bring its capacity to 60,000 kva. had been completed at the time of his death. As a part of a general reorganization of the power distribution in Indianapolis five automatic substations were completed under Mr. Todd's direction in 1925.

Mr. Todd was a past-president of the American Electric Railway Transportation and Traffic Association, Central Electric Association, and American Electric Railway Association. He became a member of the A.S.M.E. in 1907 and belonged also to the A.I.E.E. and the Masonic fraternity, in which he held the 32d degree. He also was active in the Indianapolis Chamber of Commerce and Board of Trade and a member of a number of clubs in Indianapolis and vicinity.

John Arthur Tomlinson

John Arthur Tomlinson, who died on May 14, 1928, was born at Trinidad on September 27, 1886. He attended the Queens Royal College there for seven years and then went to Leeds University, England, from which he was graduated in 1907 with a B.Sc. degree. He served an apprenticeship with the Hunslet Engine Co., Leeds, and the Great Western Railway, following which he became associated with the State Railways of India. For about three and one-half years he was connected with operations, one year personal assistant to the chief mechanical engineer, and then in charge of workshops on the Eastern Bengal Railway. In June, 1926, he was assigned to special duty with the Railway Board of India, at Simla.

Mr. Tomlinson gained special distinction during the World War for high output of shells at the Kanchrapara Locomotive Works, of which he was works manager, on the Eastern Bengal Railway.

Mr. Tomlinson belonged to the Institution of Locomotive Engineers and the Institution of Mechanical Engineers in London, and became a member of the A.S.M.E. in 1927.

Stonewall Tompkins

Stonewall Tompkins was born at Albermarle County, Va., on January 15, 1866, and died on March 6, 1928, at his home in Passaic, N. J. He was educated at the Miller School and after graduation received his technical training in their shops. In 1884 he entered the University of Virginia for a year of study in mathematics, physics, and engineering, and from there was called to a teaching position at the University of Arkansas, where he was superintendent of shops and founded the department of mechanical engineering. Later he accepted a chair at Clemson College, South Carolina, which in 1900 conferred on him the honorary degree of Mechanical Engineer. In 1898 he re-entered the University of Virginia for further professional study. For three years he was director of the Practical Mechanics Department of the Miller School, where he was in charge of extension of instruction and of the plant. For a time he served as acting superintendent of the school. Later he became professor of practical mechanics and superintendent of shops at the University of Tennessee.

In 1910 Mr. Tompkins was appointed chief engineer for the C. I. & B. R. R. Company, Brooklyn, N. Y. In 1913 he was superintendent of construction for the DuPont Company, Inc., New York, N. Y., but later returned to the C. I. & B. R. R. Company. Mr. Tompkins was one of the group of engineers who first saw the importance of steel, oil, and rubber in the industrial growth of the United States. At the time of his death he was plant engineer for the United States Rubber Company.

He became a junior member of the A.S.M.E. in 1887 and a member in 1890.

Percival Venables Vernon

Percival Venables Vernon, director and chief designer of Alfred Herbert, Ltd., Coventry, England, died at his residence, Keresley Manor, near Coventry, on July 22, 1928. He was born in January, 1871, attended the Manchester Grammar School, and received his engineering training with Kendall & Gent, Manchester, and at the Manchester Technical School. He was a Whitworth Exhibitioner in 1891 and designer for Kendall & Gent until 1895. During the next year he designed special machine tools for Babcock & Wilcox of Renfrew.

Mr. Vernon began his association with Alfred Herbert, Ltd., in March, 1897, as chief draftsman, and was made director and chief designer in 1911. He was a mathematician of no small ability and was soundly versed in the theory as well as the practice of his profession.

Mr. Vernon was a member of the Chamber of Commerce at Coventry and of the Education Committee of the city, and devoted a great deal of time to the latter, in particular. During the World War he served as director and assistant controller of the Machine Tool Department of the Ministry of Munitions, his services being recognized by the bestowal on him of the O. B. E. He was a member of the Institution of Mechanical Engineers and of its Cutting Tools Research Committee. He became a member of the A.S.M.E. in 1906. He was a golfer and enjoyed otter hunting.

Mr. Vernon is survived by his widow. Their only daughter died about two years ago.

Frank Casper Wagner

Frank Casper Wagner, president of Rose Polytechnic Institute, was instantly killed on November 21, 1928, when the automobile which he was driving was struck by an interurban car as he was leaving the grounds of the Institute.

Dr. Wagner was born at Ann Harbor, Mich., on October 5, 1864, and he received his early education in the public schools of that place. At the age of nineteen he was graduated from the University of Michigan and for many years held the distinction of being the youngest man to receive the A.M. degree at that institution. In an additional year he completed the course in mechanical engineering.

He entered the employ of the Thomson Houston Electric Company at Lynn, Mass., in 1886, his work being mainly the erection of electric lighting plants. Toward the end of his connection with this company he was sent to Mexico, where he had charge of the installation of a number of plants in and near the capital.

He returned to the University of Michigan in 1890, where he worked under Prof. Mortimer E. Cooley with the title of assistant professor of mechanical engineering. With Professor Cooley and Prof. John R. Allen he tested a Nordyke pumping engine at Grand Rapids, Mich. He also made a number of tests on a Stirling boiler, in connection with a patent suit, and thus began his work as an expert witness in patent litigation which occupied a large share of his time up to the day of his death. This patent work covered a wide variety of subjects but was mainly concerned with problems in steam engineering and heat transfer. One of his more important cases was in connection with a cracking process for the production of gasoline.

In collaboration with Mr. W. C. Ely, of Terre Haute, Ind., he designed the first rotary puddling furnace to be used in the local steel mills.

In 1896 he was offered and accepted the position of associate professor of steam and electrical engineering at Rose Polytechnic Institute, Terre Haute, Ind. He was made a professor in these subjects in 1904 and professor of mechanical engineering in 1920. He was elected president of the Institute in 1923.

Dr. Wagner held memberships in many engineering societies, among which were the A.S.M.E., which he joined in 1895, the A.I.E.E., the American Society for the Promotion of Engineering Education, and the American Association for the Advancement of Science. He was chairman of the Indianapolis Section of the A.S.M.E. in 1927 and president of the Indiana Engineering Society in 1928, and had been appointed representative of the latter organization to the American Engineering Council for 1929. Papers covering some of his tests and patent studies were presented before meetings of these societies.

Dr. Wagner was also active in community affairs and was serving as president of the Community Fund of Terre Haute at the time of his death. He joined the First Congregational Church of Terre Haute soon after going there to live, and had held nearly every official position in the lay organization of that church.

During the World War he was appointed engineer for the U. S. Fuel Administration.

Rose Polytechnic Institute conferred the degree of Doctor of Science in Engineering on him in 1924, and in 1927 he received the degree of Doctor of Engineering from the University of Michigan. He was acquainted with seven or eight ancient and modern languages and read and thought extensively on sociological subjects.

Dr. Wagner is survived by his widow, Mabel E. (Peck) Wagner, whom he married in 1892, and by five of their six children.

David Alexander Wallace

David Alexander Wallace, superintendent of the Philadelphia Instrument Shop of the Western Electric Company, died on June 19, 1928, of apoplexy. His widow and two sons survive.

Mr. Wallace was born in Dundee, Scotland, on October 15, 1868. He was educated at the West End Academy, Dundee, from which he was graduated in 1882, and at the Newark, N. J., Technical School, from which he was graduated in 1891. His early business experience in this country was in press feeding, typesetting, and copy reading in a book and job printing plant. He then served an apprenticeship in the Hewes & Phillips Iron Works, Newark, N. J., and continued with the company as draftsman for a time. In 1892-1893 he was engaged by the Corliss Steam Engine Company, Providence, R. I., on engine design and plant layout. The following year he was associated with Jno. A. Roeblings Sons Co., in drafting and supervising construction work. The Backus Water Motor Company, Newark, N. J., next employed him to design a line of gas engines.

In 1895 Mr. Wallace undertook some special investigation work with Mr. Weston of the Weston Electrical Instrument Company, Newark, N. J., and later was appointed chief draftsman for the company, with which he remained until 1899. He then became chief draftsman in the New York shops of the Western Electric Company. In 1906 he was assigned to study and report on the differences in manufacturing methods in the New York and Chicago shops. Two years later he was transferred to the Hawthorne works as general chief draftsman and was made a member of the general superintendent's staff. From that time until 1920 he was in charge of the drafting departments at Hawthorne, the introduction of all new designs of apparatus and the technical correspondence with the Engineering Department relating to new designs. In 1920, he was transferred to Philadelphia as assistant superintendent of the newly organized Instrument Shop; he became superintendent the following year.

Mr. Wallace became a junior member of the A.S.M.E. in 1892 and a full member in 1904.

Ralph Herbert Warren

Ralph Herbert Warren, whose death occurred on September 3, 1928, in New York, N. Y., was born on August 21, 1871, at Montclair, N. J. After obtaining his early education at Montclair and Lawrenceville, he entered Princeton University with the class of 1893. He left college in his Junior year on account of ill health and lived for some years at Lakehurst, N. J., where he engaged in building operations.

In 1905, his health being fully restored, Mr. Warren took a position with the Bath Portland Cement Company which he held for two years. He then entered the engineering course at Lehigh University, and was graduated in 1909 with the degree of M.E. His next position was that of economy engineer for the Alpha Portland Cement Co., which he resigned in 1918 to go overseas with the French branch of the Y.M.C.A. Upon his return in 1919 he became interested in the Hardinge Company, and later in an affiliated concern, the Quigley Fuel Company, and took charge for a time of their interests in Belgium and France. He severed the connection in 1923 to devote himself to laboratory investigations. He took out a patent on a device for crushing cement, and at the time of his death was engaged in perfecting a machine based upon this patent.

Mr. Warren married Susan A. Woolworth in 1898, and is survived by her and two daughters. He became a member of the A.S.M.E. in 1913.

Henry Jost Waterman

Henry Jost Waterman, of Cambridge, Mass., died suddenly on January 14, 1928, at Central Soledad, Cienfuegos, Cuba, where he was located during the winter months as chief engineer of the E. A. Atkins sugar plantation.

Mr. Waterman was born at Bridgewater, Novia Scotia, on September 28, 1859, the son of John A. and Isabelle (Jost) Waterman, and moved to Cambridge in early childhood. Following a grammar school education he served an apprenticeship in the machine shop of J. M. Mason, Boston, Mass. He went to Cuba in 1881 as machine-shop foreman for J. Howard, at Caibarien, and the following year became chief engineer at the sugar mill of F. Lamadrid, at Sagua la Grande. During the following years he served successively in the same capacity with Mora Oua & Co., Sagua la Grande, Brooks & Co., Santiago, and F. P. Machado, Sagua la Grande. He was chief engineer for E. F. Atkins & Co. from 1894 to 1911, then returned to the United States and spent three years as general engineer with Guiler Engineering Co., Framingham, Mass., part of which time he travelled for the company in Central America installing their sugar and coffee machinery. In 1914 he went back to Cuba to accept a position as chief engineer with the Cuba Company at Jatibonico, where he remained until 1917, when he became chief engineer for the Cuba Cane Sugar Corporation at Central Stewart, Camaguey. He was recalled to the employ of the Atkins company in 1925.

Mr. Waterman became a member of the A.S.M.E. in 1918 and was also a Mason. He is survived by his widow and five children, two daughters and three sons.

Milton LaVerne Weir

Milton LaVerne Weir was born at St. Williams, Ont., Canada, on November 12, 1896, and died on March 19, 1928. He attended Harbord Collegiate School for five years and was graduated from the University of Toronto in 1920 with a B.Sc. degree. From June, 1916, until October, 1917, he was manager and chief technical instructor at the Toronto Automobile School. During the session, 1917-1918, while in the naval service, he was automotive instructor at the Technical College, Halifax, N. S. From October, 1917, to February, 1919, he was engineer in charge of a watch at sea on cruiser and patrol trawler operation work. During the summer of 1919 he served as gas and oil instructor at the University of Toronto. After graduation he entered the employ of the Lackawanna Steel Company as assistant steam engineer and mechanical engineer. Later he became connected with the Vacuum Oil Company, Buffalo, N. Y., as sales engineer, the position he held at the time of his death.

He was a member of the Engineering Society of Toronto University and had been a junior member of the A.S.M.E. since 1921. He belonged also to the Masonic fraternity.

Edward Richardson Welles

Edward Richardson Welles, president of Public Industrials Corporation, New York, N. Y., since its organization in 1925, died at his home in Brooklyn on December 15, 1928, after a brief illness of influenza followed by bronchial pneumonia. He is survived by his widow, Marguerite Pitkin Welles, and by two sons.

Mr. Welles was born in Brooklyn on November 21, 1878. He attended Adelphi Academy, Brooklyn, and the Stevens Institute of Technology, from which he was graduated in 1900 with a B.S. degree. He spent a year with each of the following companies: East River Gas Co., Long Island City, distribution and manufacturing departments of water gas plant; Homestead Steel Works, assistant superintendent and superintendent in charge of operating and maintaining steam lines, boilers, stokers, engines, pumps, etc.; Best Mfg. Co., Pittsburgh, Pa., piping contractors, chief draftsman in charge of estimating and office end of contract work; and International Steam Pump Co. (now Worthington Pump & Machy. Corpn.), salesman of condensers, cooling towers, pumps, and compressors in New Jersey and Pennsylvania. From

1904 to 1906 he was in charge of the office end of all contract work for M. W. Kellogg & Co., New York, piping contractors.

From 1906 to 1925 Mr. Welles was associated with the J. G. White Engineering Corporation, rising from the position of draftsman to that of chief mechanical engineer. Subsequent to 1925 he continued to serve the corporation as consulting mechanical engineer. At the time of his death he was also president and director of the United Crescent Dry Cleaning Corporation, The Frink Corporation, and the Sterling Bronze Company, Inc.

Mr. Welles acted as consulting engineer for the Electric Power Equipment Division of the War Industries Board, particularly in connection with the Muscle Shoals Power project. He became a member of the A.S.M.E. in 1916.

Edward Hubbard Wells

Edward Hubbard Wells, chairman of the Board of Directors of Babcock & Wilcox Co., New York, died at his home in Montclair, N. J., on November 17, 1927. He is survived by his widow, Anna Moller (McGrath) Mickle Wells whom he married on March 26, 1927.

Mr. Wells was born on April 7, 1859, at Bradford, R. I., the son of Solomon Perry and Elizabeth Sherman (Greene) Wells. When he was seven years of age the family moved to Burning Springs, W. Va., where they lived for three years, then moving to Parkersburg, W. Va., where the boy completed his education.

At sixteen Mr. Wells became an accountant in his father's office, where he remained until 1887, when his father retired from business. He then assisted in organizing the Parkersburg Electric Light & Power Co., of which he was secretary and superintendent in charge of construction and office. The following year he went to Pittsburgh as manager of the Keystone Construction Company, which he helped organize and which later was merged with the Marr Construction Company into the North American Construction Company. Mr. Wells was in charge of sales of the latter company.

In 1892 Mr. Wells took charge of the New York sales office of the Babcock & Wilcox Co. In 1897 he was elected to its directorate and to the office of second vice-president. A year later he was chosen president and remained in that office until 1919, when he became chairman of the Board. He played a large part in the development and expansion of the lines of industry coming within the scope of his company, and invented and patented several designs of boilers and superheaters which it manufactures.

Mr. Wells was also director of Babcock & Wilcox, Ltd., London, of the North American Company, and of the Worthington Pump and Machinery Corporation. He belonged to a number of clubs in New York and vicinity, and had been a member of the A.S.M.E. since 1921.

J. Leland Wells

J. Leland Wells died at Amityville, N. Y., on June 27, 1928. He was born in New York on September 20, 1856, and spent the most of his early life there. His education was obtained in the public schools of that city and at Cooper Union. In 1873 he entered the employ of Gillis & Geohegan, of New York, heating and ventilating contractors, where he rose to be general manager and chief engineer. After about seventeen years with this company he opened his own office as consulting engineer. In 1891 he was joined in partnership by Charles P. Newton, forming the firm of Wells & Newton. The following year they took over the U. S. Heating & Plumbing Company, of Worcester, Mass., and formed the Wells & Newton Company of New Jersey, heating, plumbing, and ventilating contractors.

Mr. Wells was president of this corporation and as such took part in the construction of many prominent buildings, among which were the Plaza Hotel, New York; Union Station, Washington; Mills Building, San Francisco; Boston & Newhouse Building, Salt Lake City, Utah; Emerson Hotel, Baltimore, Md.; Mutual Life Building, Cape Town, South Africa; and Hudson Terminal Building, U. S. Realty Building, and Benenson Building, New York.

Mr. Wells retired to Amityville, L. I., N. Y., fifteen years prior to his death, and spent his time in civic affairs, assisting in the draft and acting as food and coal commissioner during the World War. He was a Mason and had been a member of the A.S.M.E. since 1885. He is survived by his widow, two sons, and a daughter.

Raymond Stuart Wells

Raymond Stuart Wells was born on December 24, 1894, in Utica, N. Y., where he attended the public schools and Utica Free Academy. He then entered Syracuse University, from which he was graduated in 1918 with the degree of electrical engineer. From that time until the close of the year he served in the Signal Corps at College Park, Md., and Camp Vail, N. J.

In January, 1919, Mr. Wells became assistant efficiency engineer at the River Station of the Buffalo General Electric Company. His work there involved steam power plant testing, calculation of operating records and test results, calibration and maintenance of boiler and turbine room instruments, and special investigations of operating methods.

In 1922 he became assistant production engineer at the Lake Shore Station of The Cleveland Electric Illuminating Company, where he was employed at the time of his death on May 10, 1928.

Mr. Wells became an associate member of the A.S.M.E. early in 1928. He is survived by his widow.

Frank Davol Williams

Frank Davol Williams, whose death occurred on October 23, 1928, was born in Brooklyn, N. Y., on October 29, 1880. He attended the Polytechnic Institute in that city and was graduated from Cornell University in 1903 with an M.E. degree. He spent three years in the employ of Babcock & Wilcox Co., being located first in the Bayonne shops, and successively as erector on warships at Newport News, erector in New York, and engineer in Cuba. In 1906 he became associated with Manuel Llera, engineer of New York, with whom he remained for some years. He had charge of the design of steam power plants, pumping plants, transmission systems, machine shops and woodworking shops, and installations. At the time of his death he was treasurer and manager of Davol & Co., Inc., New York, which was organized about ten years ago.

Mr. Williams became a member of the A.S.M.E. in 1913. He is survived by his widow, Mildred E. Williams.

Homer T. Yaryan

Homer T. Yaryan, chemist and inventor, died on September 17, 1928, at his home in Toledo, Ohio. Mr. Yaryan was born at Liberty, Ind., on December 23, 1842. He evidenced an interest in chemistry at an early age and spent his boyhood days in a small laboratory which his father provided. Later he entered the chemical works of W. J. M. Gordon & Brothers, of Cincinnati, Ohio.

During the Civil War and reconstruction period following he assisted his father, who was United States assessor at Richmond, Ind., where the family then resided.

Mr. Yaryan was not only an inventor of note, but was also a successful business man. Following his invention of a solvent process for extracting rosin and turpentine from pine stumps the Yaryan Naval Stores Company was organized in Toledo and plants built at Brunswick, Ga., and Gulfport, Miss. These plants are now owned by the Hercules Powder Co., and an additional plant has been built at Hattiesburg, Miss. Mr. Yaryan invented also a solvent process for extracting oil from flaxseed, and mills were established at Chicago, St. Paul, Toledo, Detroit, Indianapolis, Cincinnati, and Philadelphia.

The Yaryan invention of a central heating plant for carrying steam and hot water to buildings in all parts of a city led to the organization of the old Toledo Gas, Electric & Heating Co., which built plants in Toledo in 1894 and 1896 and developed the system in six other cities. The Yaryan system still is a part of the plant of the present Toledo Edison Company, and many buildings in Toledo are heated by the system.

Perhaps the best known of his inventions is the Yaryan multiple effect evaporator, for which he was awarded the Franklin Medal in 1885.

Mr. Yaryan had been in failing health for some time and had retired from active business. He spent his winters in St. Petersburg, Fla., and summers in Toledo. In addition to his chemical research he had interested himself in psychic phenomena and contributed to the literature on spiritualism. He had been a member of the A.S.M.E. since 1892.

His widow, Josephine M. Yaryan, and one son survive him.

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